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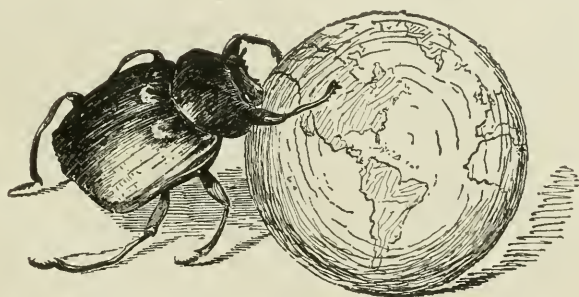
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## JOURNAL

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Vol. XIV.

MARCH, 1906.

No. 1

Class I, HEXAPODA.

Order II, COLEOPTERA.

NOTES ON SOME SPECIES OF THE GENUS  
ANOMALA WITH DESCRIPTIONS OF  
NEW SPECIES.

BY CHARLES SCHAEFFER,

BROOKLYN, N. Y.

I have a short revision of this genus nearly ready for publication, but awaiting some Mexican material for comparison and confirmation of my identifications. The following notes are published in advance.

*Anomala antennata*, new species.

Larger than *parvula* Burm., which it otherwise resembles in form, thorax with similar two dark spots at apex, but the elytral intervals are of equal size, convex. Antennal club slightly longer than the rest of the joints, pale testaceous. Head black coarsely rugosely punctured in front, more fine and sparse on the occiput, clypeal margin widely reflexed, broadly arcuate in front; eyes moderately prominent. Thorax more than twice as wide as long, sides arcuate, hind angles rounded, front angles obtuse; base finely margined; disk convex, surface rather sparsely and shallowly, punctate; color testaceous with two slightly elongate dark apical spots each oblique behind. Elytra slightly broader at base than the thorax, sides nearly parallel, disk convex, surface with nine striae, the latter not punctate, intervals nearly equal, convex, except the subsutural which is broader and somewhat coarsely punctate at basal half, punctures finer and more distinct behind middle, the other intervals scarcely punctate and uneven; color testaceous with suture and side margin slightly darker. Pygidium moderately coarsely punctate, denser at sides than at middle. Body beneath and legs testaceous; metasternum clothed not densely with long hairs; abdomen shining, scarcely punctate and with only a few hairs. Front tibiae bidentate, the larger front claw finely cleft, the upper portion very short and hardly visible, intermediate claws entire, not cleft. Length (head porrected), 10 mm.

New Mexico, one male in collection Dietz.

The formation of the male claws brings this species near *parvula* which it otherwise resembles in color, thoracic markings and form, but is larger, has a deeply excavated clypeus and the elytral intervals are different.

**Anomala flavilla Bates.**

Biol. Cent. Am., vol. II, pt. 2, p. 226, tab. XII, fig. 18.

Several specimens of this Mexican species, collected in Ehrenberg, Arizona were received from Mr. George Franck.

It is slightly more elongate than *flavipennis* Burm., the color is testaceous, with two apical thoracic spots and suture black; the alternate elytral intervals broader, not convex, the subsutural coarsely and irregularly punctate, the others more sparse and finer; the two apical thoracic dark spots extend from apex to middle, broader at the latter point and narrowing to apex; the front tibiae are tridentate and the outer claws of the front and middle tibiae are cleft. Dr. Ohaus records also dark-colored specimens from Mexico, but all those from Arizona are pale.

**Anomala centralis Leconte.**

New species N. Am. Col., 1863, p. 78.

Through the kindness of Mr. G. Beyer I received some typical specimens of this species, collected by him in Lower California. The Arizona specimens referred to this species by Dr. Horn and standing in most collections as that species, are a different thing and in my opinion only an extreme variation of *inconstans* Burm. (*lurida* of our list); *centralis* is on the average smaller and slightly more parallel, with the hind tibiae relatively shorter and broader. Of *inconstans* I have taken this year quite a number of specimens, but more of the pale than of the darker form.

**Anomala innuba Fabricius.**

Mant. Ins. I, p. 22.

This is the species called in all of our collections *minuta* Fab. The correction of this error is due to Dr. Fr. Ohaus, who has seen the type. The true *minuta* will be referred to later.

**Anomala polychalca Bates.**

Biol. Cent. Am., vol. II, pt. 2, p. 236.

I refer a few specimens taken at light near Brownsville, Texas, to this species or rather variety of *cincta* Say.



Above, below and legs more or less metallic green, thorax in one specimen with a slight coppery tinge, striae of elytra impressed and distinctly punctate, intervals nearly equal, convex, finely punctate; pygidium coarsely and in some parts confluent punctate; clypeus rounded and moderately reflexed; mesosternum broader between the coxae than in *binotata* Gyll., which it resembles in form, but is slightly larger. One specimen shows on the elytra a few dark testaceous streaks.

***Anomala luteipennis* Leconte.**

Proc. Acad. Nat. Sc. Phil., vol. VII, p. 80.

This name is wrongly applied by Dr. Horn and others to the pale specimens of *binotata* Gyll. from Texas and Arizona. Dr. Leconte describes the pygidium as being "parcius sat grosse punctatus," which is in *binotata* invariably finely rugose. Some of the pale forms of an *Anomala* which I took near Brownsville, Texas, agree in every respect with Dr. Leconte's description, also nearly with the locality; these are connected by intermediate specimens from Virginia and Texas with *flavipennis* Burm.

***Anomala peninsularis*, new species.**

Form of *binotata* Gyll., shining, testaceous, head, thorax, suture, margin and sides at base of elytra, as also the legs, reddish. Head coarsely and densely punctate, clypeus transverse, apex subtruncate, angles rounded, margin moderately reflexed, clypeal suture distinct. Thorax shining, sparsely punctate, convex, sides slightly arcuate, hind angles rounded, front angles not prominent. Scutellum coarsely punctate. Elytra widening towards apex, intervals clearly defined and alternately wider, the wider intervals flat, irregularly punctate, the costae (narrow intervals) slightly convex and almost impunctate. Metasternum clothed with moderate, long hairs, abdomen shining and sparsely punctate; pygidium transverse, subconfluent punctate, the punctures not deeply impressed. Front tibiae bidentate, the apical tooth elongate and slightly curved, the upper tooth prominent but obtuse, the larger tarsal claw cleft at tip, the upper portion finer and shorter than the lower in the male, equal in the female; outer claw of middle tarsi cleft, the upper portion nearly as long as the lower, but narrower. Length, 11 mm.; width 7 mm., male. Length, 13 mm., width 7 mm., female.

Santa Rosa, Lower California, male and female, collected by Mr. Gustav Beyer, to whom I am greatly indebted for this as well as other interesting species.

***Anomala ludoviciana*, new species.**

Form of *binotata* Gyll. but smaller, thorax and elytra more coarsely punctured, head, thorax and legs dark rufous, the thorax with slight metallic luster and elytra with or without darker spots. Head coarsely punctate in front, more finer and

sparser on the occiput, clypeus subtruncate in front, angles rounded, margin moderately reflexed, clypeal suture distinct. Thorax transverse, narrowing to the front from a little before middle, nearly straight behind, basal angles rounded, front angles prominent, surface relatively coarsely punctate, but not densely. Scutellum coarsely punctate. Elytra slightly broadening towards apex, punctate striate, the punctures dark and here and there confluent, intervals flat, alternately wider, the subsutural coarsely and irregularly punctate, the others with an irregular row of punctures, the costae (smaller intervals) slightly convex and not punctate, the disk more or less transversely rugose. Pygidium finely rugose as in *binotata*. Metasternum sparsely clothed with not very long hairs; abdomen sparsely punctate with moderately coarse but not deeply impressed punctures. Front tibiae bidentate, the larger claw cleft at tip, the upper portion shorter and much narrower than the lower; intermediate claw cleft with the upper portion finer than the lower, but nearly as long. Length 9.50 mm.; width 5.25 mm.

Vowell's Mill, Louisiana, Mr. Charles W. Leng, to whom I am indebted for the specimens.

This species is closely related to *binotata* Gyll. but differs from that by being smaller, the prothorax and elytra more coarsely punctate, and the upper portion of the cleft claw being much finer and shorter. With this species I place at present some specimens from Kansas received from Prof. Snow as *binotata* var., which have the head, thorax, scutellum and legs dark-green, but which otherwise agree with the Louisiana specimens. Similar variations are seen in *flavipennis* Burm.

***Anomala carinifrons* Bates.**

Biol. Cent. Am., vol. II, pt. 2, p. 249, tab. XIII, fig. 24.

This species is mentioned by Bates to occur in our fauna from a specimen collected by Morrison in Southern Arizona. I have two specimens from Arizona which answer the description, one of them was collected by my brother in Bisbee. It is larger and more robust than *cavifrons* Lec., the striae are faintly but distinctly punctured, the head and thorax also distinctly punctured and the surface is shining, while it is semiopaque in *cavifrons* Lec.

***Anomala minuta* Burmeister.**

Handb., vol. IV, 1, p. 249, and IV, 2, p. 504.

In the remarks following the description of *semilivida* Lec., Dr. Horn\* mentioned some darker specimens, which are the true *minuta* Burm. Dr. Ohaus' good description† of the type saved me from making a synonym, as I had these specimens already labelled with a

\* Trans. Am. Ent. Soc., XI, p. 162.

† Stett. ent. Zeit., lxiii, p. 48.

manuscript name. In the three specimens before me, which are from Florida, the thorax is dark-brown on the disk with the side margins and apex more or less pale, the elytra dark testaceous, with suture and sides more or less brown; the front and middle tarsal claws are simple, the first interval is relatively coarsely and irregularly punctate and the clypeus is not as concave as in *semilivida* Lec.

***Anomala tibialis*, new species.**

Larger, more robust and convex than *parvula* Burm., with more parallel elytra and hind tibiae very short and triangularly dilated at apex. Head piceous, front paler, clypeus dark testaceous, coarsely and closely punctate; clypeus transverse, broadly rounded in front and narrowly reflexed. Antennae moderate, club slightly shorter than the preceding five joints. Thorax more than twice as wide as long, sides narrowing to the front from before middle, nearly straight behind, hind angles rounded, front angles not prominent; disk convex, apical marginal bead nearly obsolete at middle, basal marginal bead distinct, surface testaceous with two oblique, dark, elongate markings at apex on each side of median line, the markings irregular in outline and slightly curved outward, sparsely not coarsely punctate, the punctures at sides and towards base nearly obsolete. Elytra elongate, parallel, testaceous, suture and margin dark, surface sculpture and striae more or less obscured by transverse rugae, the striae at sides more distinct and coarsely punctate. Under side testaceous, shining, metasternum moderately densely clothed with long pale hairs, abdomen with moderate punctures, which are not closely placed. Front tibiae bidentate, apical tooth elongate and slightly curved, the upper tooth sharp and prominent, the larger claw finely cleft, the upper and lower part equal in size; the larger claw of the intermediate tarsi finely cleft, the two parts equal in size; hind tibiae very short and distinctly shorter than the femora and broadly dilated towards apex. Pygidium moderately punctate, punctures not deeply impressed. Length 10 mm., width 5 mm.

Texas, one female in collection Dietz.

By the unusually short and broadly dilated hind tibiae this species is easily distinguished from all our species. It is very closely allied to the Mexican *rhizotrogoides* Blanch., but seems to differ from that species by the more parallel form and the elytral sculpture.

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**HORN'S SYSTEMATISCHER INDEX DER  
CICINDELIDEN.**

BY VICTOR E. SHELFORD,  
CHICAGO, ILL.

By far the great majority of systematic papers (monographs and systematic lists) are written with respect to unnatural geographical

areas and as a result, usually without a comprehensive study of the group or groups concerned. Among American entomologists there is an especially strong tendency to practically stop at the southern boundary of the United States, although no barrier or faunistic discontinuity occurs in that region. While it will, no doubt, be generally admitted that a careful consideration of all evidence as to the point of origin, evolution, and dispersal of all groups is necessary for the building up of a natural system of classification, systematic papers which consider such questions are at least extremely rare. All of the above deficiencies are noticeable in former treatments of boreal American Cicindelidæ while the paper under consideration (Supplement \* to Deutsche Entomologische Zeitschrift, II, 1905, 56 pp.) can be charged with none of them. It is the result of fifteen years of labor on the part of Dr. Walther Horn who has seen practically all the large collections of the world. The following are his conclusions regarding the Cicindelidæ (in broad sense):

The "Carabidæ stem" gave rise, in the Ethiopian tropics, to the first Cicindelidæ-like forms. These he calls the Protomantichoridæ; they were wingless insects (with elytra) most nearly related to two living South African families (of the Cicindelidæ in broad sense), viz.: (1) Platychilidæ, wingless forms with the usual type of elytra; (2) Palæomantichoridæ, wingless forms with fused elytra which turn under the sides of the abdomen. The Protomantichoridæ dispersed westward to America, pushed out to the north and south and after developing the Neomantichoridæ (*Omus*, *Amblychila*, *Pycnochila*) in the nearctic region, gave rise to the Prototetrachidæ, which inhabited the entire equatorial belt. Among these, complicated pilosity characters were later developed. Next forms became distinguishable by the development of two types of false pattern on the elytra; (1) brought about by partial loss of pigment, (2) by the development of a thicker pilosity in certain areas. The present predominating etched patterns are to be considered as the equivalent of such false patterns.

A wider step led to the production of the Protoeuryodidæ (*Euryoda*-*Odontochila*-*Cosmema*-like forms) which also inhabited the entire tropical region; a greater power of flight was developed among these. They gave rise to the *Cicindela* which constitute the young-

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\* Not sent to subscribers; can be obtained from the Deutsche Entomologische Gesellschaft, Berlin, for three mark.

est group of the Cicindelidæ. This genus is the result of a great amount of converging evolution, some forms having descended directly from the Protoeuryodidæ, many others having come indirectly as offspring of the Odontochilini, Dromicini and Theratidæ (families and subfamilies of the *Cicindela* in broad sense).

In the Holarctic region there are two northern tribes and two southern tribes of *Cicindela* concerning which the author presents the following hypotheses: The northern tribes arose in now warmer Africa during a cooler period; later the group separated into two parts, the smaller number moved southward to find a cooler climate and is now represented by *C. 4-guttata* Wdm. in South Africa; the greater number, however, moved northward and separated into two parts, one remaining in Eurasia and the other crossing over into North America. The two southern tribes arose in tropical America and part moved toward the south, possibly some representatives crossing over into the Australian region, while an equally large number moved northward, part remaining in the nearctic region and a part crossing over into Eurasia.

The *Cicindela* fauna of the Nearctic region is thus made up of: (1) The northern tribe or *purpurea-obscura* (*obscura-modesta*) group; frons broad and depressed, pilosity of head and prothorax erect: relatives, (a) the *soluta-hybrida-campestris* group in Eurasia, (b) the *4-guttata* group in South Africa. (2) The Southern tribe or *cupra-cens* group; frons narrow, not depressed, pilosity of head and prothorax decumbent; relatives (a) the *nivea-ritsemæ* group in the Neotropical region, (b) possibly the *helmsi-dunedensis-sætigera* group in the Australian region, and (c) the *elegans-trisignata* group in Eurasia. (3) The forms that have migrated in from the Neotropical *argentata* group; head bald, pronotum hairy on sides and disc; *unipunctata* Fabr., *belfragei* Sallé, *pilatei* Guer., *cursitans* Lec., and *celeripes* Lec., forms not understood by a study of the species of the United States alone, belong here. (4) Forms belonging to the indigenous Mexican fauna; head bald, pronotum pilose at the sides only. Our common *sexguttata* belongs to this group.

A similar analysis is made of the *Cicindela* fauna of each geographical region, the boundary countries of which (for this genus) are especially named. Other genera apparently do not present faunistic discontinuities and hence are not so treated.

So much for our author's views. He has not (presumably on ac-



count of the nature of the paper) presented in detail the evidence in support of his theses and the reviewer is accordingly unable to give an analysis of the evidence upon which they rest. There is, however, much evidence that the Cicindelidæ originated in Africa, but their origin from wingless forms with elytra, I fear, will not meet the approval of insect morphologists. On the other hand, it is evident that *Tetracha* is in many of its characters a more primitive form than *Cicindela* and its distribution speaks well for the author's conclusions. His analysis of the nearctic *Cicindela* fauna and statement of its affinities must, it seems to me, stand unchallenged, while his arrangement of our species is the most tenable yet presented.

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## Class I, HEXAPODA.

## Order IV, DIPTERA.

ON THE KNOWN LARVÆ OF THE GENUS  
URANOTÆNIA.

BY EVELYN G. MITCHELL,

WASHINGTON, D. C.

The receipt during the past summer of larvæ of *Uranotenina sapphirina* and *U. lowii* from Dr. T. W. Dupree gave an opportunity for a critical comparison of the three known larvæ of this genus, which had not previously been distinguished from each other. The genus, so far as can be judged by the known larvæ, is characterized as follows:

Four large stout spines bearing spinules instead of the usual four tufts in the middle of head; antennæ with a few scattered spines, the tuft represented by a single hair; stellate hairs on thorax and abdomen.

## SYNOPSIS OF SPECIES

1. Antennal tuft decidedly over one third distad; longest terminal spine if bent backward would reach below tuft. Scales on eighth segment of abdomen not fringed on apical one-third (reckoned from center of base to tip). Central tooth of labial plate bluntly rounded and widely separated from adjacent teeth.

**U. lowii.**

- Antennal tuft scarcely if at all over one third distad .....2
2. Longest terminal spine almost as long as antenna; accessory spine on terminal joint not nearly reaching to tip of joint. Scales of eighth segment not fringed on apical one-half. Central tooth on labial plate bluntly rounded and not widely separated from the adjacent teeth.....*U. sapphirina*.
- Longest terminal spine scarcely two thirds the length of antenna, scarcely reaching tuft; secondary spine on terminal joint reaching nearly to tip of joint. Scales of eighth segment with a fringe of uniform spines extending over apex. Central tooth of labial plate sharp and distinct from the adjacent teeth..*U. socialis*.

## Class I, HEXAPODA.

### Order V, LEPIDOPTERA.

#### NEW NOCTUIDÆ FOR 1906.—NO. 1.

By JOHN B. SMITH, ScD.,

NEW BRUNSWICK, N. J.

#### *Leptina levitans*, new species.

Ground color dull smoky gray without contrasts. Head and thorax with a whitish powdering, best marked on patagia, but not prominent on either of my examples. Primaries with the extreme base inferiorly a little paler but with no appearance of a white humeral spot and no defining or limiting line. Median space superiorly ashen gray, and a slight gray powdering is visible throughout the space. T. a. line barely traceable, a little irregular, with a small, somewhat even outcurve. T. p. line sinuate, even, narrow, gray with smoky borderings, not well defined. S. t. line very irregular, powdery gray, obscure, marked by obscure preceding dusky shades and at costa by an obscure dusky cloud which does not reach the apex. A series of dusky terminal spots. Orbicular wanting. Reniform of good size, almost round, concolorous, ringed narrowly with brown and with a brown central dot. Secondaries dirty yellowish or smoky, a little paler at base. Beneath, very pale smoky, with an obscure outer line and discal spot.

*Expands*. — 1.05–1.12 inches = 26–28 mm.

*Habitat*. — Ontario, Canada, A. H. Kilman; Durham, N. H., Weed and Fiske.

One male and one female are now before me, in comparison with three examples of *L. dormitans* with which I had in the past confused this species. I have realized for some time that there were two forms of *Leptina* without prominent white shoulders; but supposed them to be merely varying types of one species. The recent necessity for determining a series of specimens caused me to compare more closely and to resort to the original descriptions to determine the type form.

Guenée's description is clear and covers the species in which the s. t. line is prominently black shaded on costa while the new species lacks these black shadings completely, has the median lines more regular and has an obvious reniform. I have seen others, though I have only one pair at hand, and I have no doubt that its distribution will prove to be much the same as that of *dormitans*.

**Charadra ingenua, new species.**

Resembles *deridens* in general appearance and type of maculation but paler throughout. The primaries are of a decided bluish gray with the maculation neatly written and the secondaries are whitish or white, without trace of yellow and scarcely a trace of smoky toward the outer margin.

*Expands.* — 1.40–1.50 ♂, 1.72–1.76 ♂ = 35–44 mm.

*Habitat.* — Glenwood Springs and Durango, Colorado; end of June and beginning of July: Dr. Barnes.

Two males and two females in good or fair condition. I have for comparison seven examples of *deridens*, ranging from Canada to Florida and west to Pittsburg, and all agree in having a creamy tint to the gray of primaries and a decidedly yellowish shade to the secondaries. The absence of these shadings in the Colorado examples is the most conspicuous character, accompanied and emphasized by neater, better defined and yet less conspicuous maculation. The small departures from the eastern type in actual course of lines, etc., need not be specifically described.

**Bryophila avidira, new species.**

In size, wing form and general type of maculation very like *B. lepidula*, with all the green shadings eliminated. In the four examples before me and in comparison with the type form, none is as well marked as normal *lepidula* and the only well defined maculation is the brown shading on the costa between the orbicular and reniform spots. None of the maculation is as well marked in the western as in the eastern form and it seems probable that, while closely allied, we have a really distinct species.

*Expands.* — 1.06–1.24 inches = 26–31 mm.

*Habitat.* — Fort Collins, Colo., in June; Cartwright, Man., in June.

This species may be mistaken for *lepidula* until a careful examination is made, for the type of maculation is identical and the one is undoubtedly a descendant from the other; but when carefully compared the differences are sufficient in my opinion to authorize the new name.

**Noctua monteclara, new species.**

Head, thorax and abdomen of an almost uniform mouse gray; collar and patagia evident, but not prominent, vestiture mostly flattened hair. Primaries mouse gray

with the maculation almost entirely lost. By careful study it is possible to trace an almost upright, geminate t. a. line, a vague, diffuse median shade, a slightly irregular s. t. line and a large reniform which is somewhat constricted medially. Secondaries paler, more smoky gray, lightest at the base. Beneath, uniform, slightly more reddish gray, somewhat powdery, with an obscure dusky line on both wings.

*Expands.* — 1.12–1.15 inches = 28–29 mm.

*Habitat.* — Claremont, Calif., Mr. Carl Baker.

Two male examples in very fair condition, neither of them with date of capture. The species belongs in the *rubifera* series, but is distinguished from all of those known to me by its uniform mouse gray color on which the normal maculation is barely traceable.

***Euxoa claromonta*, new species.**

Head and thorax ashen gray, head a little paler; collar with a transverse, median black line; thoracic tuftings well marked. Abdomen a somewhat paler gray, lighter in the males than in the females. Primaries pale ashen gray, powdered with smoky; maculation not well defined, reniform and terminal space usually the darkest part of the wing. Basal line geminate, usually marked on costa and sometimes, also by black scales below the median vein. T. a. line geminate, marked on the costa in all specimens and below that either lost altogether or traceable across the wing; in the latter case nearly upright, a little outcurved in the interspaces. T. p. line geminate, inner part best marked and somewhat lunulate, only a little bent over cell and then about parallel with outer margin. S. t. line a little irregular, of the paler ground, defined by the dark terminal space and, sometimes, by a dusky preceding shade as well. A series of black terminal lunules, followed by a yellowish line at the base of the gray fringes. Claviform outlined in one example, barely indicated in others. Orbicular oval, oblique, tending to become irregular and incompletely closed above, more or less defined by black scales, followed by an annulus of the pale ground. Reniform moderate in size, kidney-shaped, ringed with pale and filled with blackish. Secondaries white with a variably marked dusky outer border, not differing much in the sexes; a narrow discal lunule. Beneath, gray, powdery, secondaries paler; a more or less defined outer line and discal spot.

*Expands.* — 1.25–1.40 inches = 31–35 mm.

*Habitat.* — Claremont, Calif., Mr. Carl Baker.

Three males and three females, no two alike. This is one of those obscure, variable species of the *pitychrous* series which is always troublesome when only single specimens are at hand. Its allies are *candida* and *detesta* though not readily confused with either when material is at hand for comparison. None of the specimens are dated.

***Mamestra pectinicornis*, new species.**

Head and thorax dull, smoky brown. Abdomen gray brown. Tarsi ringed with whitish and rather prominent. Primaries deep smoky brown over a lighter base, giving a somewhat powdery appearance. The median lines are barely traceable as somewhat more brownish scales occasionally edged by black scales. S. t.

line marked by obscure brown spots preceded and emphasized by black scales which may form a somewhat continuous shade and may break up into somewhat trigonate spots. There is a narrow black terminal line, the fringes are interlined with black and they are cut with black and yellowish brown. The orbicular is small, round, ringed by black scales, with or without a black central dot, filled with reddish brown. Reniform moderate in size, oval, outer half white, inner half reddish, the division between the two marked by black scales. The claviform is vaguely indicated by black scales. Secondaries dirty whitish at base, darkening to a smoky outer border. Fringes pinkish with a smoky line at base and smoky shadings toward apex. Beneath dull gray, primaries darker as a whole, on both the costal and outer margins darker, and on both a small blackish discal spot.

*Expands.* — 1.10–1.16 inches = 27–29 mm.

*Habitat.* — Palmerly, Cochise Co., Ariz., in July; Brooklyn Institute.

Two males and others in collections from the same general locality. The species is related to three Mexican species referred to *Eriopyga* by Hampson; but is obviously distinct from either. The antennæ are lengthily pectinated, and this character combined with the white marked reniform will serve to distinguish the new form in our fauna.

#### Genus *URSOGASTRA*, new.

Head moderate in size, distinct, yet hardly prominent; eyes hairy, globose, of good size; front smooth; scarcely even bulging; antenna in male simple and in the female probably so; tongue well developed, functional; palpi small and weak, scarcely attaining the middle of front; vestiture even, composed mostly of projecting flattened hair. Thorax moderate, convex, collar well defined, patagia hardly relieved, a small posterior tuft; vestiture, flattened hair only without admixture of distinct scales; legs unarmed except by the usual spurs of middle and posterior pair, somewhat aborted and set with very dense brushes of thick hair so as to conceal the parts effectively. Abdomen without dorsal tufts; in the male the 4th, 5th, 6th and 7th segments furnished with lateral tufts of long hair which curve down and under, meeting on the median line of the venter; long brushes of specialized scales are also attached to the male clasping organs. The primaries are proportionate, only a little wider outwardly, venation apparently normal; on the cell beneath, in the male, a clothing of fine silky hair similar to that found in *Orthodis*. Secondaries with vein 5 reduced to a mere fold.

This genus is based on the peculiar combination of male characters and would come under *Eriopyga* Hampson and nearest to his section C., none of the species of which are cited as typical of discarded genera. I quite appreciate that this proposed name would find a resting place in the synonymy if secondary sexual characters are ignored; but I am scarcely ready to go so far at present.

As to the species here described, it is very strongly marked and I can find nothing among the descriptions to fit it.



**Ursogastra lunata, new species.**

Head and thorax reddish fawn gray, immaculate. Primaries of the same reddish gray; basal line geminate, marked by brown or blackish scales; t. a. line geminate, very oblique, reaching almost the middle of inner margin; t. p. line geminate, broken, obscure, even, a little outcurved over cell, then almost parallel with outer margin; s. t. line pale, defined by brown scales on each side, almost rigidly parallel with outer margin. A series of small black terminal lunules; a yellow line at base of fringes. The ordinary spots are replaced by a large deep chocolate brown lunate mark, the concavity toward the costa, and this forms at once the most prominent and distinctive character. Secondaries dull smoky, with a darker discal spot and outer shade band; secondaries whitish, without marks.

*Expands.* — 1.25–1.30 inches = 26–28 mm.

*Habitat.* — Huachuca Mts., Ariz., Dr. Barnes; Palmerly, Cochise Co., Ariz., in August, Brooklyn Institute Collection.

Two somewhat defective males only are at hand. I cannot recollect that I have ever seen this species elsewhere.

**Genus NOCLOA, new.**

Head of moderate size, retracted rather than prominent; eyes naked, hemispherical, without bristly lashes; front protuberant, conical, obtusely terminated, with a roughened impression at tip; palpi moderately developed, reaching the middle of front, terminal joint short and knob-like; tongue moderately long, functional; frontal vestiture woolly, the hair somewhat flattened at tip; antennæ simple in both sexes. Thorax well developed, quadrate, vestiture of flattened hair, loose and somewhat diverging; collar and patagia well marked; a small frontal and somewhat well defined, partly divided posterior tuft; vestiture of underside long, loose, divergent; legs rather short, well developed, with hairy clothing, without spines, claws or other armature except the usual spurs of tibia. Primaries rather short in proportion to body, costa not very convex, outer margin obliquely arcuate; venation normal to all appearance. Secondaries proportionate, vein 5 weak, midway between 4 and 6.

This genus resembles *Cirrhophanus* in habitus, but differs from it and the surrounding genera to which I would have referred the species by the unarmed fore-tibiæ.

**Nocloa plagiata, new species.**

Ground color a reddish luteous; the maculation is red, brown or deeper tinted. Head unicolored or with only a faint inter-antennal line; collar brown tipped; tuftings a little darker than the ground. Primaries, basal line barely traceable, basal space of the paler ground except for a dark brown spot on the inner margin. T. a. line geminate, outer portion distinct, inner a mere line of brown scales, outwardly oblique, dislocated on the costal vein, outcurved in the interspaces. T. p. line geminate, outer portion obscure, inner narrow, linear, a little denticulate in the upper part of its course, widely outcurved over the cell, the included space a little paler than the ground. The median space is as a whole the darkest part of the wing, though not contrasting; a median shade, best marked on costa and just below darkens



the space between the ordinary spots and spreads out into the dark lower filling, to reappear on the inner margin. The orbicular is concolorous with the ground, large, irregular in form, not well defined. The reniform is large, broadly oval, concolorous, not well defined. The claviform is traceable, brown margined but not notably distinct. S. t. line narrow, whitish, irregular, preceded by a large blackish brown triangular patch on costal area and by a smaller, blackish spot opposite the cell. Through the fawn gray terminal space is an even, well defined whitish line before the base of the fringes, and followed by two narrow, broken brown lines. Secondaries dirty yellowish white with a dusky submarginal band and a vague discal spot. Beneath, primaries smoky, becoming reddish gray outwardly, s. t. space and line indicated; secondaries whitish, powdered with reddish gray over the costal region.

*Expands.* — 1.05–1.12 inches = 26–28 mm.

*Habitat.* — Arizona; southern Arizona, Poling; Palmerly, Cochise County in August, Brooklyn Institute Collection.

One male and two females in good or fair condition. I know of nothing with which this form is likely to be confused.

***Nocloa rivulosa*, new species.**

Head and thorax reddish luteous, immaculate. Primaries dull luteous, markings darker, with an olivaceous tinge. Basal line traceable. T. a. line geminate, zig-zag, so as to confuse the entire basal area. T. p. line geminate, both parts distinct, narrow, rivulous in its course and as a whole parallel with the outer margin. The median shade is broad, somewhat diffuse, strongly marked, outwardly angulated in the middle of the wing, its course decidedly regular. S. t. line parallel with outer margin, rivulous, pale, preceded by a darker shade and followed by alternate light and darker lines parallel to its course, to the outer margin. Orbicular of moderate size, concolorous, not well defined. Reniform kidney-shaped, traceable with some difficulty. Secondaries dull whitish, outwardly darker, with an extra-median and terminal paler line. Beneath primaries yellowish to smoky, with a discal spot and pale s. t. line; secondaries pale, with a dusky discal spot and an outer dusky line.

*Expands.* — 1–1.20 inches = 25–29 mm.

*Habitat.* — Santa Barbara, Calif., Hy. Edwards Collection, Amer. Mus. N. H.; Yuma Co., Ariz., March, Mr. Hutson; Phoenix, Ariz., March 19, Dr. Barnes.

One male and two females in only fair condition. Two of these are very old examples, the third, the male, being the only recent example and making description possible. There is no danger of confusing the two species described under this generic name despite their general similarity.

HELIOTHINI.

The accumulation of undetermined material of this series in my collection led me to attempt its rearrangement recently — a task that has been simplified by Sir George F. Hampson's work; but which

nevertheless remains yet somewhat unsatisfactory because of the inadequately described Strecker species. The result of this study showed an unexpectedly complete series of the described forms and a large series of new species, which are herewith presented. That there will be further additions is certain, because many species are local and every new region will, almost inevitably, turn out new forms. Besides being local, many of the species are also solitary, individual examples being taken only at long intervals. For that reason it seems likely that few cabinets will have a good representation until all the localities have been well collected over.

I have accepted Hampson's separation of *Schinia* and *Lygrantheia* but do not follow him in his suppression of *Heliothis* in the sense heretofore used: in fact I follow none of the changes made by him and based on the "first species as type" rule.

***Heliothis niveicosta*, new species.**

Ground color rather bright luteous, due to a whitish wash over a darker ground. Head and base of collar paler, tending to whitish on front. Primaries with costal region whitish, becoming white before the t. p. line, and cut before the apex. There is an obscure wash of whitish over the submedian vein, best marked in the median space and cut off at t. p. line. T. p. line diffuse, pale, well removed toward outer margin, obliquely sinuate from costa near apex, to inner margin one third from hind angle. S. t. space is the darkest part of the wing, followed by a narrow paler terminal space. Fringes of ground color at base, outwardly paler. Secondaries yellowish white, a little smoky, with a blackish discal spot and an outer band which is interrupted by a whitish blotch near middle of margin. Beneath, primaries blackish, with a narrow costal and inner, a broad outer pale border and a diffuse discal blotch. Secondaries whitish with a discal dark lunule.

*Expands.* — 1.15 inch = 29 mm.

*Habitat.* — Southern California.

One female in not the best condition, received years ago from Dr. Barnes, numbered 154. Indications are that the male may belong to the series in which there is a costal dilation, making it a *Heliocheilus*. Unfortunately the specimen contains no indication as to time or exact locality of capture.

***Thyreion stena*, new species.**

Head and thorax very pale citron yellowish, abdomen blackish with fine whitish vestiture that interposes a film over the dark ground. Primaries very pale lemon yellowish with a pink shade extending from base parallel to costa to the s. t. space; another, from same point extending through submedian interspace to anal angle, and a connecting shade through s. t. space which does not reach the costa but does reach the inner margin at anal angle. A pinkish shade over basal area generally. Fringes

shaded with pink. Secondaries uniformly smoky blackish with pinkish white fringes. Beneath, primaries blackish with pinkish white fringes secondaries with blackish disk shading off to paler and pink at the margins.

*Expands.* — .92–1.00 inch = 23–25 mm.

*Habitat.* — Golden and Fort Collins, Colo., in June.

Two males, one female; one pair from Prof. C. P. Gillette, one taken by myself at Golden.

I had confused these with *rosea*, which is a larger species, more deeply tinged and with less pink. The material in this series is not abundant and the range of variation is not known; it is quite probable, however, that specimens with much less pink will be found and there may be immaculate forms.

***Melicleptria antonio*, new species.**

Head, thorax and abdomen black; clothed with thin, divergent yellow and carmine hair on thorax, the terminal segments of abdomen yellow. Primaries carmine at base and to the t. a. line, which extends inwardly oblique from two-fifths of costa to one-third of inner margin: the line itself diffuse, whitish, median space yellowish with a luteous tinge, shaded with carmine on the costal and inner margins; s. t. space very even, carmine near costal and inner margin, olivaceous brown between these points. Terminal space testaceous except at anal angle, where the carmine shading becomes marked. Fringes yellow. The orbicular is an obscure, diffuse blotch. Secondaries black with a bronzed shading; fringes white. Beneath, primaries smoky black, the apical region of costa and apex carmine, fringes whitish; secondaries smoky black, costa carmine to apex which is yellowish, that color extending on fringes almost to the hind angle.

*Expands.* — .55 inch = 14 mm.

*Habitat.* — San Antonio, Tex., in April.

A single male specimen in very fair condition from Dr. Barnes. The species has the narrow wings and depressed costa of *pulchripennis* and is the smallest species of the genus in our fauna.

***Melicleptria sabulosa*, new species.**

Head, thorax and abdomen black, more or less densely clothed with yellowish white divergent hairs, which give the prevailing tint to the head, thorax, and terminal segments of the abdomen. Primaries with the basal space yellowish, more or less washed with carmine to the t. a. line which is diffuse, distinctly carmine, and is inwardly oblique from two-fifths of the costa to one-third of the inner margin. Median space dull yellow, costal region smoky or carmine. T. p. line carmine, almost parallel to outer margin, outwardly diffuse and merging through the s. t. space into a broad, dull yellowish terminal space. Fringes carmine. There is a narrow, obscure, upright reniform, without definite margins. Secondaries black, with whitish fringes; in the male with a whitish median band, in the female without markings of any kind. Beneath, primaries yellowish with blackish shadings along costa at base, and out-

wardly, not extending to the apex; secondaries black with a yellowish median band and a more or less obvious shading along the costa and at apex.

*Expands.* — .66-.70 inch = 16.5-17.5 mm.

*Habitat.* — "California"; Doble, Calif., April 19.

One male from Mr. Henry Edwards; one female from Mr. George H. Hutson; both in good condition. The male, received many years ago from Mr. Edwards, is faded, and has the peculiar livid hue of desert species; the female from Mr. Hutson has the same desert characteristic, but is more brilliant, and has the distinct carmine washing that is lost in the older example. The whitish band of the male is indicated in the female and, I doubt not, occasionally occurs in the latter sex. In wing-form, the species resembles *antonio* and, indeed, the general type of maculation is similar. In general, the resemblance is to *fasciata* Hy. Edy., which has a distinct s. t. line and shade.

**Melicleptria cresina, new species.**

Head, thorax and abdomen black, covered with olivaceous yellow hair, which is scant on the abdomen except at tip. Primaries, base and s. t. space carmine, median space yellow except on costa; terminal space luteous with an olivaceous tinge; fringes chocolate brown at base, olivaceous at tip. T. a. line from costa one third from base, outwardly curved to the middle, there forming an angle and running inwardly oblique to within the basal third. T. p. line a little sinuate, but on the whole nearly parallel to outer margin. S. t. line irregular, marked only by the contrast between s. t. and terminal space. Orbicular large, dusky, with a carmine suffusion, obscurely defined. Secondaries black with a narrow, clear white median band which is broader toward costa but reaches neither costa nor hind margin; fringes yellowish. Beneath, black with a median white band on both wings, that on the primaries broken by a blackish reniform spot; costal margin of secondaries and apex of all wings yellowish.

*Expands.* — .64-.75 inch = 16-19 mm.

*Habitat.* — Los Angeles County, Calif., in April.

Two females in good condition collected by Mr. Koebele. The resemblance is to *H. fasciata* Hy. Edwards, which, however, is generically distinct. The wing form is like that of *pulchripennis* and to the series typified by that species, the present form belongs. There is a close general resemblance to *sabulosa*, which is not borne out on more particular examination.

**Melicleptria sexata, new species.**

Head and thorax black, densely clothed with thin loose olivaceous or grayish hair. Abdomen black in the female, more olivaceous in the male, the difference due to the more abundant vestiture of the latter which conceals the ground. Primaries

smoky brown with an olivaceous tinge or overlay, median space yellowish or whitish, terminal space a little paler to the yellowish fringes. The solid brown basal area is outwardly bounded by the outcurved t. a. line which is pale like the median space. T. p. line is also pale, only a little sinuate and separates the pale median space from the solid brown s. t. space. S. t. line whitish, diffuse, broad, very close to the outer margin. The large reniform is of the darker color and fills a large portion of the upper portion of the median space. Secondaries black, with traces of a tawny median band in most specimens. Beneath, primaries black except apex, median space and fringes, which are yellowish; a large black spot in the median pale area; secondaries black except along costa and an incomplete, interrupted median band.

*Expands.* — .68-.72 inch = 17-18 mm.

*Habitat.* — Aweme, Man., July 21, Mr. Criddle; Roundthwaite, Man., Marmont.

Three males and four females, all in at least fair condition. Two pairs are from Aweme, one male is from Roundthwaite and two females, dated July 27, have no locality label. The species is allied to *vitlosa*, than which it is smaller, stouter, with the secondaries almost solidly black.

***Melicleptria subatra*, new species.**

Head and body black; vestiture thin, olivaceous yellow, slightly tinting the head, thorax and terminal segments of abdomen. Primaries smoky to blackish with an obscure carmine tinge. Median space yellowish or whitish, costa and inner margin of the smoky ground, reniform very large, blackish, combining with the costal and marginal shadings to break the pale area in the three more or less connected blotches. S. t. line distinct, yellowish, outwardly diffuse, a little sinuated, fringes whitish. Secondaries black or a little bronzed, with a whitish or yellowish median band which is completely divided by the large blackish discal spot. Fringes whitish. Beneath, primaries creamy yellowish, upper half of base and all beyond t. p. line except apex blackish, a large, constricted discal spot also black. Secondaries creamy yellowish, inner margin and a discal spot black.

*Expands.* — .80-.90 inch = 20-22 mm.

*Habitat.* — Mt. Rainier, Wash.; Gallatin Co., Mont., elevation 9,400 feet, July 10.

Two males and one female in tolerably good condition; one male and one female numbered 631 of the Washington Experiment Station. In type of maculation this resembles *sueta* = *californica*; but it is much smaller, lacks all the carmine shadings and is altogether a more sordid form.

***Melicleptria triolata*, new species.**

Head, thorax and abdomen black, clothed with thin, divergent whitish hair. The thorax is scarcely more heavily clothed than the remainder of the body and the whole impression is of a thin fleecy covering. Primaries with base, s. t. and terminal



spaces dull, smoky; median space and the broad subterminal shade line pale yellowish. Basal space uniform, smoky, overlaid by yellowish hairs. T. a. line with an inward tooth on the median vein, else as a whole outcurved. T. p. line outwardly oblique from costa, forming a sharp angle on vein 4, thence with a moderate incurve to base. S. t. line broad, diffuse, pale, only a little irregular. Fringe pale. Orbicular moderate or small, smoky. Reniform large, smoky, oblong, only a little constricted medially. Secondaries black, with yellowish fringes, and with a yellow discal area in which is a large black discal blotch. Beneath, dull whitish, median area with a yellow tinge, the darker portions of upper surface showing through. Primaries with a small black orbicular and a large black reniform. Secondaries with a large, black, lunate spot.

*Expands.* — .67-.72 inch = 17-18 mm.

*Habitat.* — Los Angeles Co., Calif.; Argus Mts., Calif., in May.

One male and two females, two of them in very fair condition. The specimen from the Argus Mts. was collected by Koebele, belongs to the National Museum and has a little more of the desert habitus than the other examples which, while collected in an arid region, were not so distinctly in a desert area.

***Melicleptria dobla*, new species.**

Head, thorax and abdomen black, more or less clothed with yellowish white scales. The collar has a blackish median line and the abdomen is bare of white vestiture except at base and tip. Primaries blackish brown or smoky, with an overlay of whitish scales which is irregularly distributed and probably varies; median space whitish, powdered with blackish below vein 2. Basal line whitish, marked on costa. T. a. line whitish, more or less confused with median space, as a whole with an even outcurve. T. p. line evenly and rather deeply sinuate, S-shaped, clearly defined, though narrow. S. t. line narrow, whitish, irregular. A series of blackish terminal lunules. Fringes of the dark ground color. Orbicular traceable as a black shade on t. a. line; but not distinct. Reniform large, subquadrate, blackish, the most prominent feature of the wing. Secondaries black with white fringes. Beneath, primaries black at base; median space yellowish with a large black reniform, outer area black, apex yellowish. Secondaries black except along costal and outer margins, which are yellowish. Body black, breast with yellowish fine divergent vestiture.

*Expands.* — .78 inch = 19.5 mm.

*Habitat.* — Doble, Calif., April 5.

One good female collected by Mr. George S. Hutson. It is totally different from all the other species with black secondaries and has no very close allies in the genus.

***Melicleptria edwardsii*, new species.**

Head and body smoky brown; vestiture of head and thorax dull brown, tipped with yellow, giving a yellowish cast to the surface. Abdominal vestiture smooth, edges of the segments narrowly pale-ringed. Primaries dull smoky brown over a sordid pale tawny. The basal and s. t. spaces are mostly smoky brown; the median



space is mostly tawny and the diffuse s. t. line is of the same tint. Basal line single, distinct, pale. T. a. line broad, tawny, edged with black and brown scales, its course an almost even outcurve, a trifle broken on the median vein. T. p. line dirty whitish, with almost a rectangle on vein 5, and running inwardly oblique and a little incurved below. S. t. line very irregular, so deeply indented opposite the cell that the s. t. space is nearly cut. Terminal space narrow, smoky, with a darker brown terminal line. Median space marked with dull brown inferiorly. Ordinary spots very large, dull brown, almost completely filling the cell. Secondaries tawny with a large black discal spot and a broad marginal band in which there is a tawny outer line near the angle. Beneath, primaries very pale tawny, discal spots of upper side distinctly, other maculation more faintly reproduced; secondaries with a decidedly coppery red tinge; a large black discal spot and a diffuse submarginal shade toward anal angle.

*Expands.* — .92 inch = 23 mm.

*Habitat.* — Yellowstone Park, Wyo., in July; Burrison, collector,

One female in good condition, save that the antennæ are wanting; received through Mr. W. D. Kearfott. The species is so utterly unlike any other species heretofore referred to the genus that there should be no difficulty in identifying it.

**Melicleptria flavidentia, new species.**

Head, thorax and abdomen black, clothed with olivaceous yellow hair, most dense on thorax and at the tip of the abdomen. Primaries with a carmine shading in basal and s. t. spaces; median space prevailing yellowish; s. t. space and extreme base olivaceous. The t. a. line makes a very marked and characteristic inward tooth on the median cell and thus relieves the orbicular which would otherwise be absorbed in the basal area as it is in *sueta*. T. p. line marked by the difference in shade between median and s. t. space, sharply defined, only a little sinuate. S. t. line not marked: there is simply an olivaceous shade between the carmine red of the s. t. and terminal spaces. Fringes pale olivaceous. The inner and inferior portion of median space are tinted with olivaceous. Orbicular large, obtusely oval, carmine. Reniform large, oblong, broad, angles rounded, outer margin a little indented at middle, carmine shaded. Secondaries black, with olivaceous yellow fringes. Median area yellowish, with a broad black discal spot which cuts the band and gives the wing an appearance of being black with two yellowish median spots. Beneath, body clothed with thin, yellow, divergent hair. Primaries, basal area black with a yellow, sagittate central mark; median area yellow with a large, black discal spot; s. t. space yellow from costa nearly to inner margin, this shade gradually narrowing until it is entirely lost in the broad black band at inner angle. Secondaries, pale yellow; black at base; median area with a large black discal spot. A narrow black extra median line merging into a black band toward anal angle.

*Expands.* — .92 inch = 23 mm.

*Habitat.* — Utah, July, 1900.

One male from Dr. Barnes, in good condition. The species looks, at first sight, like a small example of *sueta*; but the character-

istic indentation of the t. a. line and the other distinctions pointed out, justify the new species.

**Schinia macroptica, new species.**

Head and thorax with an ochreous brown powdering over a luteous base ; abdomen dull yellow. Primaries with median space silvery white, else luteous with ochreous brown powderings ; a large somewhat transversely oval ochreous brown reniform making the most conspicuous feature of the wing. T. a. space powdery, extending to the t. a. line, which is rigid, a little oblique, and marked only by the contrast of silvery median and ochreous basal space. T. p. line marked in the same way against the s. t. space, even in course, rather widely bent over the large reniform then evenly oblique to the hind margin. S. t. line pale, very irregular, almost cutting the s. t. space opposite cell. Apex and upper portion of terminal space golden brown, shading into the palest ground at anal angle. A series of deep brown terminal marks. Fringes luteous, not cut or interlined. Secondaries whitish at base, with a broad washed-out outer band and whitish fringes. Beneath, primaries smoky, paler at base, with a large blackish discal spot and a yellowish s. t. line. Secondaries white with a faint yellowish tinge.

*Expands.* — .86 inch = 21 mm.

*Habitat.* — Southern Arizona, Poling.

One female without date or definite locality, but probably from Pima County in September. The very large discal spot of primaries, shaded with golden brown in the silvery white median space, marks this species at once. From *oculata*, to which the new form is allied, it differs by the much broader basal and outer luteous areas, as well as by the much larger and differently shaped reniform.

The tibial armature consists of a long, not very pointed inner claw and a stout spine above it, while on the outer side are two shorter, claw-like spines.

**Schinia biforma, new species.**

Head and thorax tawny yellow : abdomen clothed with thin hair of the same color over a black base. Primaries deep tawny over a lighter yellow base. The median lines are broad, of the pale ground, diffuse, tending to broaden toward the center so as to lighten the median space. T. a. line nearly rectangularly bent above the middle. T. p. line feebly bisinuate. S. t. line obscure, even, of the pale ground. Fringes pale. No discal spots. Secondaries evenly black, with yellow fringes. Beneath primaries blackish, apex and margins more or less tawny ; secondaries pale tawny, shaded with blackish toward the inner margin.

*Expands.* — .76-.80 inch = 19-20 mm.

*Habitat.* — Kerrville, Texas.

One male and two females, the former in poor, the latter in good condition. In size and wing-form the species resembles *roseitincta* ; in

the uniformly black secondaries and tawny simply marked primaries it differs from all others of the genus. The vestiture of the head and thorax is predominantly hairy and rather close. The fore tibia has one long somewhat curved inner claw and two spines above it, while at the outer side it has three shorter claws decreasing in size from the tip.

***Schinia olivacea*, new species.**

Head and thorax olivaceous gray, the greenish tinge quite obvious; abdomen with a thinner covering of olivaceous over a brown base. Primaries, basal space brown, with a distinct reddish tinge at the base which becomes overlaid by olive green until at the t. a. line it is the darkest part of the wing. T. a. line pale, rather evenly and not very much outcurved. Median space olivaceous gray, forming the palest portion of the wing anteriorly, darkening to a more intense olivaceous outwardly until it merges into the s. t. space, obscuring the very narrow gray t. p. line which is even, obliquely bisinuate. S. t. line greenish gray, distinct, very even, parallel to the outer margin. A broken, black terminal line. Fringes cut with brown. Secondaries an even brownish black, fringes whitish. Beneath, primaries smoky except on the costal margin and fringes; the latter cut with blackish, the former by a t. p. line; secondaries costal half dull yellowish gray, with a discal spot and outer line, inferior half blackish, fringes yellowish.

*Expands.* — .84 inch = 21 mm.

*Habitat.* — Beeville, Tex., in October.

One female only, dated in 1895. I feel quite sure that I have seen other specimens of this but have no record. It is allied to *arcifera* and the male may differ in color. The anterior tibia has one long pointed inner claw and three smaller outer spine-like claw-processes.

***Schinia ferricasta*, new species.**

Head and thorax light chestnut or somewhat rusty brown; abdomen more yellowish. Primaries with basal space pale chestnut brown. T. a. line whitish, outwardly merging into the pale median space, with a wide and rather even outcurve. T. p. line whitish, well defined, evenly and very slightly bisinuate. Median space dull luteous gray with a brown tinge outwardly. S. t. space velvety brown, a little less red than in basal space, lightening a little toward the outer margin to indicate a vague pale s. t. line. Fringes concolorous with terminal space. A vague indication of a reniform is traceable. Secondaries a somewhat deep coppery yellow from base to beyond middle, where a blackish shading begins, extending to the outer margin. Fringes lurid yellow. Beneath, primaries tawny yellow to beyond middle, a blackish s. t. space and a rosy red terminal space; discal spot black; secondaries yellow at base shading to rosy and then to brownish outwardly.

*Expands.* — .92-1.00 inch = 23-35 mm.

*Habitat.* — Palmerly, Cochise Co., Ariz., August, Collection Brooklyn Institute; Baboquivaria Mts., Pima Co., Ariz., July 20;

Mr. O. C. Poling: Huachuca Mts., August 1-7; Santa Catalina Mts.; Pinal Co., August 24, Dr. Barnes.

Five male specimens, the one from the Brooklyn Institute in perfect condition, the others somewhat defective. The species is obviously related to *arcifera* and may be an extreme form of it; but I do not believe that likely. The new form is altogether lighter as a whole, and the median space is contrastingly paler. The median lines also, while similar in course, are much broader and more conspicuous. It is probable that the female will be found to have black or brown outer secondaries.

The tibial armature consists of one long inner and two shorter outer claws with the accessory spines small and defective.

***Schinia erosa*, new species.**

Head, thorax and primaries except median space a rather bright luteous. Head and thorax immaculate. Primaries with well defined maculation, the median space white or whitish, contrasting or with a wash of the ground color which obscures the bright effect. The basal space has no markings and is only a little curved at its outer border which is well defined. The outer portion of the median space becomes a little luteous shaded below the reniform, deepening so as to relieve a whitish t. p. line which is well curved over the cell and a little incurved below. S. t. line whitish, very irregular, appearing as though gnawed from the outer side, this appearance heightened by a preceding dusky shade which becomes black at some points along the edge of the line. There is a very narrow pale line at the base of the fringes which are obscurely cut with pale. The orbicular is vaguely indicated by a few dull scales. Reniform of good size, oblong, a little oblique, dusky, the outer border marked with black scales. Secondaries whitish to beyond the middle, then a rather broad, irregular, diffuse smoky or blackish band, beyond which the terminal area is yellowish to the whitish fringes. There is a large black discal spot. Beneath, whitish; primaries with a small round orbicular and a large oblong reniform, black, contrasting, s. t. line of the upper side being even more sharply marked than above; secondaries with the discal spot and extra-median band of upper side duplicated.

*Expands.* — .80-.88 inch = 20-22 mm.

*Habitat.* — Utah; Phoenix, Ariz., Sept. 16 and 24.

Three examples, one of them a female, are at hand. The Utah example is old and its source is not known as it has only one of the old State labels. Of the Phoenix examples one belongs to Dr. Barnes and bears his number 123; the other was given me by Mr. Wm. H. Broadwell and is the best specimen of the three.

The fore tibial armature consists of one very long pointed claw at the inner angle and above it two or three spines along the inner margin; one moderately long pointed claw at the outer angle and two smaller claws above it on the outer side.

**Schinia pallicincta, new species.**

Head and thorax pale lemon over clay yellow; abdomen a little paler. Primaries yellow luteous over a whitish base, the median lines broad, whitish, diffuse. T. a. line nearly upright. T. p. line oblique a little outcurved over cell. In one specimen the s. t. line is quite well defined near costa by preceding brown scales; in the other it is almost lost. No discal spots. Secondaries blackish with a rosy red tinge; fringes pale. Beneath, primaries yellowish with blackish disk and discal mark a little tinged with rosy. Secondaries yellowish with a smoky disc which is strongly tinged with rosy.

*Expands.* — .72-.80 inch = 18-20 mm.

*Habitat.* — San Diego County. Calif. : Utah.

Two female examples, both somewhat defective. The two examples are very much alike in appearance and essential structure; but differ in that the Utah example has a very distinctly marked s. t. line which in the California example is obscure. The former is to be considered the type should the latter prove to be distinct. The fore tibia has a very long inner curved claw and two shorter outer claws also slender and somewhat spine-like.

**Schinia tobia, new species.**

Head and thorax olivaceous luteous over a whitish base. Abdomen whitish. Primaries dull olivaceous with the transverse markings broadly white. Extreme base white. T. a. line a broad white band, inwardly defined, outwardly diffuse, broader on the costa and internal margin, a little outcurved. T. p. line broad, white, margins not sharply defined, tending to broaden on costa and inner margin. S. t. line a little irregular, undefined, not strongly marked. S. t. space is darker than ground on costa and internal margin, and paler between these points; but no well marked blotching occurs. Fringes a little paler than ground. The reniform is a whitish lunule which may become almost or quite obsolete. Secondaries whitish, with a dull olivaceo-luteous outer margin; fringes white. Beneath white, primaries a little gray shaded and sometimes with a discal spot.

*Expands.* — .92 inch = 23 mm.

*Habitat.* — Phoenix, Ariz., September 16-23.

Two good females, through Dr. Barnes; very similar in appearance and obviously allied to *sexplagiata* and *biundulata*, really in a way intermediate, yet differing from both. The fore tibia has a long, slender, pointed inner claw with two much smaller spines above it, and two shorter outer spine-like claws and smaller spines above them.

**Schinia constricta, Hy. Edw.**

This species has long been a puzzle to me and I have been keeping close watch for specimens since I first saw the type in 1882; but until recently without success. In my Revision of 1883 I note that,



"It is closely related to the preceding [*rivulosa*] while easily separated from it." The characteristic feature in which the species differs from all its congeners is that there is no complete median space and there are no median lines. From the costa a t. a. line starts normally, but instead of crossing the wing it forms a segment of a circle, reaching the costa again at the place of the t. p. line. On the inner margin a similar mark occurs and between the two segments the ground color extends through the center of the wing.

On the occasion of a visit to Boston in September, 1905, I had opportunity to look over the very interesting collection of Mr. H. H. Newcomb and found to my delight an example of *Schinia constricta*, though not exactly typical. It came from New York in the Emily L. Morton collection, was marked New Windsor, 22, VII, '91, and was a unique. It had the lines marked as in the type; but the dark shading did not extend across the median space and which was quite obvious throughout. The relationship to *rivulosa* was now so clear that I determined we had only an aberration to deal with and looked over my own specimens, finding a clear tendency to narrow the space between the median lines. One example had them so nearly approximated that the space was all but divided and was a perfect intermediate between the normal form and the New Windsor specimen.

*Constricta* must, therefore, in future rank as an aberrational form of *rivulosa* and not as a distinct species. The original type is from North Carolina and as the second specimen is from New York, the aberration may occur anywhere within the range of the species.

***Schinia accessa*, new species.**

Ground color silvery white, overlaid by pale olive green, so that only the lines show the ground. Head, edge of collar and patagia and disc of thorax white marked. Abdomen whitish. Primaries with the transverse lines in the form of broad, oblique white bands. Basal space shaded with white above and below the median vein. T. a. line with a long outward tooth on the cell extending almost to reniform, inwardly oblique below. The band is inwardly bounded by a darker edging, outwardly without a sharp defining edge between the white and olive. T. p. line very oblique with a little outcurve over cell and a little indrawing below; inwardly indefinite, outwardly edged by black scales which may form spots. S. t. line narrower, white, even, close to and parallel with outer margin; fringe white. The reniform is in the form of an oblique, elongate lunule with the margins black, the center concolorous. Secondaries white, with a more or less distinct outer blackish band and a blackish discal lunule. Beneath, primaries whitish, with the maculation of upper side incompletely reproduced, the reniform black filled and the orbicular present as a black spot. Secondaries also with markings of upper side feebly indicated.



*Expands.* — 1.04–1.16 inches = 26 – 29 mm.

*Habitat.* — Kerrville, Texas.

I have two female specimens, one well preserved though papered, the other without locality and somewhat rubbed, from Dr. Barnes, but almost certainly from Kerrville also, though by a different collector. The armature of the fore tibia consists of a heavy inner claw, above which is a curved stout spine and a series of small spines, and three outer blunt claws decreasing in size toward base.

The species is allied to *trifascia* in appearance and belongs next to it in Hampson's arrangement, differing most obviously in the angulated t. a. line and huge reniform spot.

***Schinia alensa*, new species.**

Ground color dull creamy white, the markings olivaceous luteous. Head and thorax immaculate, thorax a little washed with luteous. Basal space luteous, darkening a little to the t. a. line which is defined by the contrast between basal and median space and is evenly arcuate. Median space white to the t. p. line which is evenly bisinuate, marked by the contrast between median and s. t. space, the median space broken by an outer, diffuse shade which may form a somewhat even band and may broaden inferiorly so as to leave only broad pale median lines. S. t. space olivaceous luteous, almost cut opposite the cell by a deep indentation from the pale terminal space. A series of dusky or blackish terminal marks at the base of the dusky fringes. The reniform is marked by two small black dots connected by a narrow line of black scales. Secondaries white, with a dusky, obscure outer border and a faint discal spot. Beneath, primaries creamy gray with a large, blackish discal mark. Secondaries white, immaculate.

*Expands.* — .86–1.00 inch = 22–25 mm.

*Habitat.* — Southern Arizona, August 1–15, Poling; Wilgus, Cochise Co., Ariz., no date.

Two males and two females in fair condition, a pair from each locality, through Dr. Barnes. There is some variation in the intensity of the darker shading and some in its extent; but as a whole the specimens look very much alike. The relationship is to *separata* with which the new species agrees in tibial armature.

***Schinia illustra*, new species.**

Head and thorax rather pale ochereous yellow, abdomen whitish yellow. Primaries a little deeper in ground than the thorax, the shadings in brownish ochre. T. a. line even, with a moderately long median angulation, preceded by an ochre-brown shading and marked by a few dark scales outwardly — otherwise the line is concolorous. The outer portion of median space is filled by an ochre-brown shade which includes the t. p. lines, invades the s. t. space and from which rays extend along the veins to the outer margin. T. p. line of the ground color, outwardly denticulated on the veins, in course very evenly bisinuated. There is no s. t. line. Orbicular want-

ing. Reniform an irregular, linear, whitish line, with a deeper brown shading on each line. Terminal dots on some of the veins, the brown shadings crossing the whitish fringes. Secondaries, whitish, with a lustrous yellowish reflection. Beneath, whitish, with a yellowish shading; primaries with a blackish discal spot, some brown subapical spots and brown marks on the fringes; secondaries with an obscure subapical brown shading.

*Expands.* — 1.10 inches = 27 mm.

*Habitat.* — Glenwood Springs, Colo., July 20.

One good female which has been in my hands for years, originally received from Dr. Barnes. The fore legs are missing hence the armature cannot be described; but it is probably not unlike that of *wal-singhami*, to which the new species is most nearly allied. The most characteristic feature of the species is the absence of an s. t. line and the rayed terminal area.

***Schinia megarena*, new species.**

Head and thorax creamy white, more or less tinged with ochereous brown. Primaries, ground color a rather dull white, the maculations and shadings formed by ochereous and brown scales. The large, blotch-like reniform, which is more or less marked by black scales is the only conspicuous feature of the wing. The extreme base is white, the brown powderings darkening gradually to the narrow t. a. line which is somewhat irregularly angled and, as a whole, nearly upright, emphasized by a few black scales. The median space is white to beyond its middle, then darkened by a powdery ochereous band which crosses the reniform and runs close to the t. p. line inferiorly. T. p. line geminate, the inner line powdery and obscure, the outer marked with black scales, a little irregular and sometimes almost lunulate; in course with a long outcurve over cell and a moderate incurve below reniform. S. t. space brown, powdered, very irregular outwardly where it marks the whitish, diffuse s. t. line. Terminal space brownish powdered except at apex, which is usually white. A series of terminal black lunules. Fringes ochereous, with a white interline. The orbicular may be absent or may be marked by a narrow, incomplete ring of black scales. Secondaries white. Beneath, primaries with a slightly gray tinge, with prominent reniform and a more or less well defined orbicular—though the latter may be entirely wanting.

*Expands.* — .88–1.00 inch = 22–25 mm.

*Habitat.* — Kerrville, Tex.; Utah, August 4 to September 6, Poling.

Nine males and four females all from Mr. Poling. Only one male is from Kerrville, the others have simply the "Utah" and date label. All the examples are a little worn or defective.

In a general way this resembles a bleached out *S. tertia* with immaculate secondaries. The type of maculation is the same; but the details vary greatly and this is not nearly so handsome a species.

**Eupanychis camina, new species.**

Head and thorax dull, smoky luteous, some of the thoracic scales with a metallic lustre. Primaries smoky black over a dully whitish base. Basal space blackish, extends fully one third of the wing, limiting the t. a. line by the contrast in color with the pale median space. In course the line is somewhat acutely and a little irregularly outcurved. Median space whitish, more or less black powdered, interrupted by the large, oblong, black reniform. T. p. line rather evenly bisinuate, best marked by the contrast with the black s. t. space. S. t. space black with a dusting of whitish scales, narrowed by the outcurve of the t. p. line. S. t. line whitish gray, diffuse, a little irregular, darkening outwardly into the smoky terminal area. A broad, black, lunate terminal line. Fringes smoky at base, whitish at tip. Secondaries black, disc whitish with a large black discal spot almost dividing it, fringes tipped with gray. Beneath, primaries with maculation of upper side essentially reproduced but more contrasting. Secondaries mostly whitish with black basal and discal spots and a black margin which is incomplete apically.

*Expands.* — .76 inch = 19 mm.

*Habitat.* — Hampton, New Hampshire, Weed and Fiske, No. 2164.

One female specimen in fair condition. It is obviously allied to *spinosa* in general appearance; but is smaller, entirely without red-brown admixture and not nearly so well marked. It has almost the appearance and color of a diminutive *Heliothis*.

**Thalpochares hutsoni, new species.**

Ground color a faint creamy white, varying toward luteous. Head thorax and abdomen concolorous, immaculate. Primaries as a rule a little darker than body, the maculation a darker shade of the ground color with a slight olivaceous tinge in the best marked specimens. Basal line discernible in one specimen, broad, diffuse, broken. T. a. line broad, single, faintly relieved, with a rather even outcurve, recognizable in about half the specimens and distinct in one. T. p. line a distinct band, a little sinuate, as a whole nearly parallel with outer margin, broken by the round reniform which is concolorous with the band and is cut out of it by a whitish outline. A median shade band extends from the middle of costa to the t. p. line below the cell; but is complete in one example only. Terminal space is a little darker, but no s. t. line is relieved. A series of black terminal dots. Secondaries whitish with a faint yellowish tinge, fringes white. Beneath, primaries smoky; secondaries white.

*Expands.* — .64 inch = 16 mm.

*Habitat.* — Yuma Co., Ariz., in March, Mr. Hutson.

Six examples, evenly divided as to sex, and all in good condition. This little species is neatly if inconspicuously marked, and is named after its collector, from whom I have received not a few novelties as the result of his desert wanderings. That these explorations were primarily for gold and that the capture and care of the specimens

added much to the labors of the journey does not detract from Mr. Hutson's merit. No one sends better specimens than he does !

This species also has the cylindrical frontal process and will be associated with *catalina*, I believe.

***Thalpochares catalina*, new species.**

Head, thorax and abdomen white, slightly lustrous. Primaries white, with a slight creamy tinge ; immaculate to the middle, and nowhere with contrasting maculation. Beyond the middle of costa a vaguely luteous band bends outwardly through the cell, there forms an obtuse angle inward, becomes better marked and broader, reaching the inner margin a little beyond the middle. This band varies in width and in distinctness. At the outer border is a broad margin of faint bluish gray, through which the white, slightly sinuous s. t. line is traceable. A series of black terminal dots is obvious in one specimen. Fringes white. Beneath ; primaries blackish, fringes white ; secondaries white.

*Expands.* — .80 inch = 20 mm.

*Habitat.* — Yuma Co., Ariz., April 19, Hutson ; Babaquivera Mts., Pima Co., Ariz., July 16-23, Dr. Barnes ; Tuscon, Ariz., May 13-14 and Catalina Springs, Ariz., July 5, Mr E. A. Schwarz.

Three males and three females, half of them in rather ragged condition, yet all characteristic. Seems to be rather widely distributed, yet obviously not over-common.

It is probable that this species will have to be removed from *Thalpochares* eventually, because like so many of our desert forms, this has a frontal protuberance, cylindrical and truncate, covered by the vestiture in good examples but readily exposed. I do not propose a new generic term here, because the species of this and allied genera are not well represented in collections and the limits of the genera already named are by no means accurately defined.

***Bomolocha lotalba*, new species.**

Ground color a dirty luteous gray ; head and thorax immaculate, abdomen paler, with narrow whitish segmental rings. Primaries more or less shaded with smoky, with a conspicuous rigid narrow yellowish s. t. line, more or less defined by a dusky preceding shade, more distinct in the male than in the female. T. a. line single, smoky, rather broad, somewhat diffuse, with small outcurves between the veins and as a whole a little outcurved. T. p. line narrow, smoky, not well defined, irregular yet scarcely crenulate, well curved over the cell and as deeply drawn in below. There is a broken, scarcely lunate terminal line. Reniform an obscurely defined dusky blotch of moderate size. Secondaries whitish ; there is an outer, rigid yellowish line abruptly bent near anal angle, preceded by a dark shading, which seems like a continuation of the s. t. line of primaries ; toward the base there is a less distinct continuation of the t. a. line of primaries. Beneath, both wings with a slight reddish tinge, powdery, with smoky median and extra-median lines and a dusky discal spot.

*Expands.* — .92-1.00 inch = 23-25 mm.

*Habitat.* — Cartwright, Man., Mr. E. Firmstone Heath.

Two males and three females are at hand, all of them of Mr. Heath's collecting and three of them very good examples. The relationship is to *ochreipennis*; but the species is smaller, different in color, the lines differ somewhat in course and the enlargement of the ♂ antenna is made up in a different way — a character that must be figured rather than described.

## DESCRIPTIONS OF NEW AMERICAN MOTHS.

By HARRISON G. DYAR, A.M., Ph.D.,

WASHINGTON, D. C.

Family COCHLIDIIDÆ.

Genus *SEMYRA* Walker.

### *Semyra mariæ*, new species.

Dark blackish brown. Fore wings heavily obscured, without lighter areas, but the terminal portion beyond the line of a more purplish luster. Line faint, fine, bluish, from beyond middle of inner margin, slightly bent inward, running to the costal-subapical mark, which consists of a small dark brown spot, nearly surrounded by a bluish halo. Submedian space basally reddish with a slightly raised dot. Hind wings brown, considerably lighter over disk to base. Expanse, 27 mm.

One ♂, St. Laurent, Maroni River, French Guiana (Wm. Schaus).

Type no. 9132, U. S. National Museum.

Named in honor of Miss Mary Hudson of Plattsburgh, New York.

The species is allied to *S. distincta* Möschl., and I have considered the possibility of its being the male of that species; but none of the species of *Semyra* are sexually dimorphic, so I have decided that it is more probably distinct. The lines are placed as in *distincta*, but the apical part of the marking is obliterated.

Family PYRALIDÆ.

Subfamily PHYCITINÆ.

Genus *MYELOIS* Hübner.

### *Myelois glendella*, new species.

Light gray, the lines black except the subbasal blotch which is olivaceous. Wing whitish, thickly dusted with black scales. Inner line broad, straight, distinctly oblique, edged with whitish within; an olivaceous gray half band before it on



inner margin; discal dots conjoined, diffused; outer line slightly bent inward in subcostal and submedian interspaces, slightly dentate, followed by a whitish edge, beyond which is a faint subterminal gray line. Black dots on the termen. Hind wings pale grayish. Expanse, 22 to 23 mm.

Two ♂, Glenwood Springs, Colorado (Dr. Wm. Barnes), one of the specimens in Dr. Barnes's collection.

Type no. 9100, U. S. National Museum.

#### Genus ZOPHODIA Hübner.

##### *Zophodia polingella*, new species.

Similar to *Z. glaucatella* Hulst, but much larger and the outer line more incised. Light gray, whitish on costal half, inner margin between the lines strongly shaded with fuscous to median vein. Lines faint, black, the inner line bent at an angle on median vein, the outer incised subapically, supplemented by a black triangle on costa. Discal dot single, large, sublunate. Hind wing white. Thorax gray with a black posterior band. Expanse, 26 to 32 mm.

One ♂, one ♀, Southern Arizona, April 1-15 (Poling). The ♀ is in the collection of Dr. Barnes.

Type no. 9101, U. S. National Museum.

#### Genus POUJADIA Ragonot.

##### *Poujadia pimella*, new species.

Palpi long, sickle-shaped, obliquely upturned, three times as long as the head. Fore wings with 11 veins, 4 and 5 stalked; hind wings with 7 veins. Fore wings flesh colored, the costa broadly dark gray; gray scales scattered on all the veins; a white ray along median vein, running out on the stalk of veins 4 and 5. Hind wings grayish, fringe pale. Expanse 24 mm.

Two ♂, Babaquivera Mts., Arizona, Pima County (Wm. Barnes). One type is in Dr. Barnes's collection.

Type no. 9102, U. S. National Museum.

#### Genus OLLIA Dyar.

##### *Ollia parvella*, new species.

Costal half of fore wing white with slight darker lines on the veins toward apex. Inner half pale ochreous, shading to gray next to white part. Hind wing whitish. Expanse, 12 mm.

Six ♀, Brownsville, Texas, May 31 to June 9, 1904 (H. S. Barber).

Type no. 9103, U. S. National Museum.

Without the ♂ the generic position is in some doubt, but lies between *Ollia* in which the male antennæ are simple and shortly pectinated, and *Pectinigera* Ragonot (= *Cayuga* Hulst), in which they are modified at base by a scale tuft.



## Class I, HEXAPODA.

## Order XI, ORTHOPTERA.

## THE CYRTOPHYLLI OF THE UNITED STATES.

BY A. N. CAUDELL,

WASHINGTON, D. C.

(PLATE I.)

The members of the group Cyrtophylli, generally known as true Katyids, are rarely numerously represented in collections, though at times they are rather common in some localities. The nights may resound with the song of the males and yet the listener never see one of the songsters. This is accounted for by the habitat of the insect, which is in the tallest trees available. In the vicinity of Washington they live in tall trees in the woods, thus escaping notice by the greater number of people. In some localities they are numerous and, in the absence of large trees, live in orchards and shrubbery. In such localities they are no rarity to the farmer or fruit grower but in places where large trees abound one may live a life time and rarely see one, though often hearing the stridulations of the male. The sound made by these insects is the loudest made by any orthopterous songster known, being indeed, unsurpassed by any insect of any order except the Cicada, or harvest fly. The song of the common species, *perspicillatus*, consists of a rasping note repeated from two to five times, usually three, followed by a short pause. The same species seems to vary its song from time to time, sometimes the note being repeated but twice and again as many as five times, the number probably depending upon the vigor of the insect as well as upon the temperature. The number is said to vary quite regularly in the number of beats per minute according to whether the temperature is higher or lower. The number per minute at a temperature of 82° is said to be about 89 while at 58° it is but 15 to 20. The notes have a fancied resemblance to the words "Katy-did," or "Katy-did, she-did."

The female of these insects, at least that of the common species, *perspicillatus*, is unique among Orthopterous insects, so far as known, in that they stridulate in a manner similar to that of the males. The elytra are partially opened and closed just as are those of the males during stridulation. The roughened surface of the triangular anal

areas rub over each other, like the tympani of the males, the right elytron sliding beneath the left one. The resulting sound is a sharp scraping note heard easily for several yards. This sound is made by the female when disturbed by handling but whether or not it is ever made voluntarily in nature is not known, but it presumably is when the insect is disturbed by any cause. Not enough study has been given the various species of these interesting insects in nature to admit of their separation on song and habit. But little is recorded regarding their breeding habits. Jaeger, *Life of North American Insects*, p. 108, says the female oviposits in the soil but his observations, which are also given by Lord in *Science Gossip* for July, 1865, must have been faulty as the eggs are quite surely deposited in crevices in the bark of trees. Professor Riley secured eggs from a female in captivity. They were inserted into a piece of cork and some into crannies in the breeding cage. On October first of last year Mr. Barber secured a female of *perspicillatus* ovipositing by night on Plummers Island, Md. The ovipositor was inserted into the bark of a small Elm tree a few feet above the ground. This is probably not the usual place of oviposition, the eggs more likely being inserted into the bark of large trees some considerable distance from the ground. The young feed on the leaves and very probably rarely or never leave the shelter of the tree upon which they were born. They mature in July and live till killed by the coming of cold weather. In the vicinity of Washington the males commence stridulating in the latter part of July and continue till about the first of October, rarely later.

The song is heard from dark to nearly daylight throughout August and well into September. But as the nights grow cooler they stop earlier and the survivors that live to sound their note after the middle of October rarely do so at night, the notes being feeble and made during the afternoon. Mr. Barber has heard the note of *perspicillatus* as late as the first week in November. But evidently very few individuals live that late in the latitude of Washington.

Considerable doubt exists as to whether or not these insects ever fly. I have repeatedly endeavored to persuade specimens to fly, but without success. Both Mr. Barber and I have succeeded in getting specimens to spread the wings and sail to the ground, alighting with a thud, but no attempt was made by the insects towards actual flight. They probably soar from one tree to another after the manner of the flying-squirrel. They may also at times actually fly as Mr. McAtee

claims to have seen a "katy-did with round wings" flying about the tops of tall trees on Plummers Island, Maryland. The elytra were held rigid while the insect was in flight, like those of *Coleoptera*. But, being at such a height above the observer, accurate observations were necessarily difficult and error may have resulted.

Five nominal species of this group have been recorded from the United States, *C. perspicillatus* Fabr., *concaus* Harr., *zimmermanni* Sauss., *hypericifolius* Stoll, and *floridensis* Beutenm. Eliminating certain of these through synonymy or being erroneously referred to our fauna and adding three new species we have six species referable to three genera. These genera may be separated as follows:

Pronotum scarcely longer than the middle width, the lateral lobes quadrate or higher than long; supraanal plate of the female no more than twice as long as the middle width, apically broadly rounded or subtruncate.

Anterior tibiae spined above; pronotum subtruncate posteriorly, the lateral carinae subpersistent; posterior femora with about ten spines below on the outer carina; supraanal plate of both sexes convex above on the basal two thirds and longitudinally sulcate; cerci of male with the branches parallel, the tips no farther apart than the length of the lower branch.... **Paracyrtophyllus**.

Anterior tibiae unarmed above; pronotum posteriorly rounded or subangulate, the lateral carinae not indicated anterior of the principal sulcus; posterior femora with about five or six spines on the outer carina below; supraanal plate of both sexes concave above on the basal fourth only or nearly wholly flat; cerci of the male with the branches divergent, the tips further separated than the length of the lower branch..... **Cyrtophyllus**.

Pronotum considerably longer than the middle breadth, the lateral lobes decidedly longer than high; supraanal plate of the female more than twice as long as the middle width, apically narrowly rounded ..... **Lea**.

#### Genus **PARACYRTOPHYLLUS**, new.

Color green. Head short, broad; interocular space about four times as broad as one of the eyes; vertex dorsally sulcate, very narrow, about one half as broad basally as one of the eyes, acute with the sides straight. Antennae long and slender, nearly twice as long as the body, including the wings, the basal segment much enlarged; antennary scrobes laminate on the inner side, as long as the vertex; eyes subglobose, small but prominent. Prothorax short, broad and stout, the disk granulous or rugose, nearly flat and crosses by two transverse sulci, usually fairly distinct but sometimes more faint, the posterior one generally the more distinct and situated about the middle, the anterior one, sometimes quite indistinct, cutting the anterior half about the middle; posterior margin of the pronotal disk subtruncate; lateral lobes vertical, subquadrate or slightly higher than broad, the lower and anterior margins straight, the posterior margin straight below, inclining slightly backwards above; lateral carinae persistent, usually obscured near the anterior border of the pronotum; pro-, meso- and metasterni each armed with a pair of quite long sharp spines, those of the

prosternum cylindrical, the others more or less triangular. Abdomen heavy, one of the segments near the base tuberculate above in the male and the penultimate segment in the same sex is very broad and somewhat flaring; supraanal plate convex and longitudinally sulcate above on at least the basal two thirds, but little longer than broad in either sex, apically broadly rounded, sometimes subtruncate; subgenital plate of the male prominently produced as a long flattened slightly tapering blade, dorsally concave and cleft in the apical third, the two branches more or less connate. Ovipositor a broad slightly curved blade, about two times as long as the pronotum, slightly broadened mesially and apically quite abruptly pointed, subapically armed on each side with two or three short transverse ridges and very finely and dully serrate below on the apical fourth or less; the central portion of the ovipositor is so thin as to be translucent but the tip and both margins are thickened and opaque. Cerci of female rounded, pointed, the tips obscurely and briefly furcate; of male angular and forked, the branches parallel (Fig. 6). Elytra very broad, and usually convex giving the insect a very rotund appearance, the basal half or more of the costal area in the male is subhyaline with conspicuous parallel transverse veins and the speculum is exceedingly well developed (Fig. 1); wings ample, considerably shorter than the elytra. Legs slender, weak; anterior tibiae with slit-like foramina present on both sides, hind femora about three and one half times as long as the pronotum, moderately swollen on the basal half or three fifths, armed below on the outer carina with ten short stout spines; middle and anterior femora armed on both margins below with several spines on the outer carinae of the middle ones and the inner carinae of the anterior ones\* the opposite carinae with but three or four spines, sometimes but one or two. Tibiae flattened above with acute margins, the anterior pair armed above on the outer carina with half a dozen stout spines, none apical, the inner carina unarmed or with but one or two minute spines; middle and posterior tibiae armed above and below on both sides with a number of spines.

Type: *P. robustus* Caudell.

The description of this genus has been made in full as those of the following ones are somewhat comparative with it.

The measurements given in this paper are made as follows: Width of elytra is at the widest point. Length of the ovipositor, and of the subgenital plate of the male the measurement is from the extreme ventral base direct to the tip. Width of the subgenital plate of the male is the width at the widest point of that portion projecting beyond the tip of the body. Width of the pronotum is the width at the broadest point, always across the posterior part. Width of ovipositor is the width at the widest point beyond the body.

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\* In descriptive entomology confusion is liable when mention of the outer or inner side of the anterior legs is made, when in a natural position the inner side of the anterior femur is really the outer side when corollately considered. For the sake of convenience the legs are always considered as being in a natural position when being described, that is the posterior and intermediate ones directed backwards and the anterior ones directed forwards.

**Paracyrtophyllus robustus, new species** (Pl. 1. figs. 1 and 6).

Robust; thorax heavy and broad, disk flat, considerably elevated in the posterior third, less so in the female; transverse sulci moderately distinct, the anterior one less so; lateral carinae persistent and moderately acute, usually somewhat obscured in front of the anterior transverse sulcus. Elytra about twice as long as broad in the female, in the male about one and one half times as long as broad; wings considerably shorter than the elytra. Supraanal plate of both sexes convex above on the basal two thirds or three fourths and longitudinally sulcate, the apical portion flattened and apically broadly rounded or sometimes subtruncate; subgenital plate of the male longer than the thorax, slightly and gradually tapering, the tip split, the two parts distinct and apically subcompressed; cerci of the female slightly broader than thick, about five times as long as the basal width, somewhat incurved and apically incised; that of the male divided into two long parallel branches, incurved apically, the lower branch with about the apical half bent inwards and backwards (Fig. 6). Ovipositor broad and about two and one half times as long as the length of the thorax.

Length, pronotum, male, 6-7; female, 6-7; elytra, male, 28-29; female, 28-30; posterior femora, male, 22-23; female, 22-25; subgenital plate, male, 13; ovipositor, 17 mm. Width, pronotum, male, 8.5; female, 8-9; elytra, male, 19; female, 14-16; subgenital plate, male, 2.25-2.5; ovipositor, 3.5-3.75 mm.

Type no. 9143, U. S. National Museum.

Five specimens are before me, three males and two females, all from Texas without definite locality except one female, the largest specimen, which is from Tiger Mills. Other specimens are in the Scudder collection at Cambridge, Mass.

The broader thorax with its more distinct lateral carinae, the dorsally armed anterior tibiae and the shorter elytra and wings make this insect easily distinguishable from related forms. The song and habits are very probably similar to those of the species belonging to the following genus. I had thought to construe the *Cyrtophyllus perspicillatus* of Fabr., to be this form but was prohibited from doing so by the pronotum of his species being described as posteriorly rounded, which is not true of this species.

**Genus CYRTOPHYLLUS Burmeister.**

*Cyrtophyllus* Burm. Handb. Ent., II, 697 (1838).

Superficially closely resembling the previous genus but is readily distinguished from it by the general form, which is less robust, and by the distinctly more elongate elytra. Structurally there are a number of correlated characters separating this genus from its allies. Lateral carinae of the pronotum distinct only behind the principal transverse



sulcus and the posterior margin of the disk is more rounded, or sometimes subangulate. The anterior tibiae are unarmed above and the posterior femorae are armed below on the outer carina with but four or five spines, rarely six or seven. Supraanal plate in both sexes flat and nonsulcate above or convex and longitudinally sulcate only on the basal fourth or less. Cerci of the male with the forks divergent, the tips separated by a distance greater than the length of the lower branch. Ovipositor more than twice as long as the pronotum.

Type: *Locusta perspicillata* Fabricius.

The distinctness of this genus from the preceding one is undoubted, the separating characters being ample to make easy the differentiation of the two genera. Besides the characters enumerated above the subgenital plate of the male is differently shaped, being more hastate in *Cyrtophyllus*. The supraanal plate of the male of this genus is also different, being about as broad as long, while in *Paracyrtophyllus* it is longer than broad.

Brunner (Mon. Pseudophylliden) considers the genus *Chlorocalus* of Bates a synonym of this genus. I very much doubt the correctness of this view as the insect described by Bates does not seem congeneric with the insect typical of *Cyrtophyllus*.

We have four species belonging to this genus. They may be separated by the following table :

Cerci of the male with the lower branch simple.

Lower branch of the cerci of the male with the incurving apical portion scarcely as long as the less tapering basal portion; the cerci between the two branches less enlarged (Fig. 7); elytra of the female broadly rounded apically and the posterior margin usually as convex as the costal margin (Fig. 3).

Larger; transverse sulci of the pronotum distinct, usually quite conspicuous; elytra of the female less elongate than in the alternating category.

**perspicillatus.**

Smaller; transverse sulci of the pronotum less distinct, usually inconspicuous; elytra of the female distinctly more elongate than in the alternate category.....

**elongatus.**

Lower branch of the cerci of the male with the incurving apical portion as long as the thick, uniformly tapering basal portion, the cerci between the two branches much enlarged, forming a triangular projection (Fig. 8); elytra of the female narrowly rounded apically, the posterior margin almost straight (Fig. 2).....

**intermedius.**

Cerci of the male with the lower branch conspicuously forked (Fig. 9).....

**furcatus.**



**Cyrtophyllus perspicillatus Fabricius** (Pl. I, Figs. 3, 4, 7).

*Locusta perspicillata* Fabr., Ent. Syst., II, 36 (1793).

*Cyrtophyllus perspicillatus* Burm., Handb. Ent., ii, 697 (1838).

*Pterophylla concava* Harr., Encycl. Americana, viii, 42 (1835).

*Cyrtophyllus zimmermanni* Sauss., Rev. Mag. Zool., 1859, 206 (1859).

*Cyrtophyllus concavus* Scudd., Journ. Bost. Soc. Nat. Hist., 1862, 272 (1862).

Considerably less robust than *Paracyrtophyllus robustus*. Thorax usually a little longer than broad, sometimes quadrate, the disk transversely convex, longitudinally flat or sometimes considerably elevated posteriorly; the anterior margin straight, the posterior margin rounded or subangulate; transverse sulci, at least the anterior one, very distinct and well defined; lateral carinæ indicated only behind the principal sulcus and there usually quite rounded. Elytra broad and strongly concave, of the same structure as those of *P. robustus* but more elongate than those of that species, those of the female being about two and one half times as long as broad; wings ample, not as long as the elytra, but considerably longer than those of *P. robustus*. Supraanal plate of both sexes somewhat longer than broad, flat or nonsulcate or convex and longitudinally sulcate only in the basal fourth or little more, often more distinctly so in the female, apically broadly rounded or subtruncate; subgenital plate of the male two or more times as long as the pronotum, the projecting portion somewhat hastate, the two halves of the divided apex generally more or less connate; cerci of female round, six or seven times as long as the basal breadth and slightly curved upwards, the tip usually very inconspicuously notched; cerci of the male forked, the two branches divergent and incurved, the lower branch simple, with a minute subapical denticle on the lower side and usually a little shorter than the upper one, the incurving apical portion not quite as long as the scarcely tapering basal portion. Ovipositor three or more times as long as the pronotum, microscopically serrate below near the tip, the serrations sometimes very inconspicuous, armed laterally, as in *P. robustus*, with two or three short transverse subapical ridges.

Length, pronotum, male, 5.5-6; female, 5.5-6; elytra, male, 35-38; female, 37; posterior femora, male, 20-21.5; female, 20-23; subgenital plate, male, 12-14.5; ovipositor, 18-20 mm.; width, pronotum, male, 6-6.5; female, 6.25-6.5; elytra, male, 18-21, female, 16; subgenital plate, male, 2.5-2.75; ovipositor, 3.25 mm.

This species extends south to South Carolina, west to Kansas and north into Canada. I have specimens before me from Massachusetts, New York, New Jersey, Maryland, District of Columbia, North Carolina, Missouri, Kansas and Iowa.

There are a number of minor variations present in the structure of this and the following species. The tip of the upper branch of the cerci of the male is sometimes simply acute and sometimes with the point subapical. The ventral subapical denticle of the lower branch is sometimes obsolete and there is a little variation in the shape of the elytra, of the posterior border of the pronotum and in the dis-

tinctness of the transverse sulci of the thorax. Were all these minor points of difference considered the number of species would be undesirably multiplied.

The *C. zimmermanni* of Saussure is placed as a synonym of this species with considerable certainty. The posteriorly angulate pronotum prohibits its being *P. robustus* and the oval elytra of the female indicates its identity with *perspicillatus* rather than with any of the following species. The correctness of this conclusion is also indicated by the pronotum being described as rugose, a condition more obvious in *perspicillatus* than in the other species. The habitat, however, is more southern than common with *concarvus* and an examination of the type might show it to belong elsewhere. But according to the only evidence available, that of the printed description, it is most appropriately placed here.

*Gryllus perspicillatus* of Linnæus, Amœn. Acad. vi, 398 (1763), which has been referred here by Scudder, does not belong to this group at all. It is, so far as I know, an unidentifiable nymph and is referred to by Fabricius in the same work in which the insect now under discussion was described.

*C. hypericifolia* Stoll, which was described from Surinam, has been referred to the synonymy under *perspicillatus*, but probably erroneously so, as it is scarcely likely that a species from Surinam would extend into our region. However the locality may have been wrongly given in Stoll's description, in which case his species may well be referred here, as the figure or description presents no discordant features.

This species is better known than any other member of the group and yet comparatively little is known of it, except as regards its song. Many writers have written accounts, poetic and otherwise, of the song of the katydid. The number of notes are said to bear a certain relation to the temperature, as previously mentioned.

All that is known of the breeding habits of this species has been previously discussed. Harris, Ins. Inj. to Vegetation, has described the eggs of *Microcentrum* as those of this species. Riley, Missouri Report, v, p. 123, describes the true eggs as follows:

“.25-.30 inches long, very flat, over thrice as long as wide, pointed at each end, with the edges beveled off or emarginate. They are of a dark slate-color and are thrust into crevices and into the softer parts of bark or of stems. The lower or first inserted end is protected by a dark adhesive substance, which hardens and sometimes extends the whole length of one of the borders; and several eggs are usually pressed close to each other.”

*Perspicillatus* is not a rare insect in certain localities in the vicinity of Washington. On Plummer's Island, Md., some miles above the city, it is one of the many insect musicians which make a night spent there so enjoyable. This island, the site of the club house of the 'Washington Biological Field Club,' is one of the most primitive regions within reach of Washington. On the island are many large chestnut trees and in these trees live the katydids, which, with the aid of numerous other orthopterous musicians, make the August night one long dream of blended melody. A midsummer night spent with congenial spirits in the club house on Plummer's Island is a pleasant experience not easily forgotten.

**Cyrtophyllus elongatus, new species.**

Very closely allied to the preceding species but usually distinguishable with considerable certainty by the smaller size and especially by the much more elongate elytra of the female. The smaller size and more elongate elytra of the females give them a decidedly more slender appearance than seen in any other species of the group. The elytra are variable in shape, sometimes having the posterior border nearly straight and sometimes quite as convex as the costal margin.

Length, pronotum, male, 5; female, 5-5.75; elytra, male, 33-34; female, 32-38; posterior femora, male, 17-20; female, 19-20.5; subgenital plate, male, 12-13.5; ovipositor 16-18; width, pronotum, male, 5.5; female, 5.5-6; elytra, male, 18-18.5; female, 13.5-16; subgenital plate, male, 2.25-2.5; ovipositor, 3-3.5 mm.

Type number 9135 U. S. National Museum.

Four males, seven females from Pennsylvania, Virginia, Indiana and Texas. Type male and female from Crawford and Fountain Counties, Indiana, August. (W. S. Blatchley.)

This species, as seen from the above mentioned localities, occupies about the same territory as the preceding species, extending however a little further south. But *perspicillatus* will probably be found to occur in the gulf states also.

Mr. D. Clemmons took a male specimen of this species on Piney Branch, D. C. It was stridulating, and he says the notes were sharper and more brisk than those of *perspicillatus*. I have found the females at Falls Church, Virginia, in late October, where they were killed by frost and had dropped to the ground. A female of *perspicillatus* was found under similar circumstances on Plummer's Island by Mr. H. S. Barber on October 17 of last year.

**Cyrtophyllus furcatus, new species.** (Pl. I, fig. 9.)

Male only known. Practically indistinguishable from *C. perspicillatus* except by the cerci, which are remarkably different. The lower branch is scarcely at all incurved apically and is without a ventral subapical denticle but is armed about the middle on the inner side with a black-tipped branch about as long as that portion of the cercus beyond it. The two branches are also somewhat more divergent.

Length, pronotum, 6; elytra, 37; posterior femora, 21.5; subgenital plate, 17; width, pronotum, 6.5; elytra, 18.5; subgenital plate, 2.75 mm.

Type no. 9136 U. S. National Museum.

One male, West Point, Nebraska.

The very unusual structure of the cerci of this form makes it quite unadvisable to consider it other than a valid species. The color is reddish brown rather than green, but this is evidently due to discoloration as the same is true of some specimens of other species.

**Cyrtophyllus intermedius, new species.** (Pl. I, figs. 2, 8.)

Somewhat allied to both *perspicillatus* and *elongatus*, to the former by the longer posterior femoræ and more nearly to the latter by the smaller size, the indistinct transverse sulci of pronotum and the narrow elytra of the female. The cerci of the male are different from those of either of the allied species, the lower branch being shorter, with the apical incurved portion about as long as the basal portion, which is thick and uniformly tapering; the cerci between the upper and lower branches is much enlarged, more so than in any other species seen, forming a triangular lobe (Fig. 8). The elytra of the single female specimen seen are peculiar in having the posterior margin, when the elytron is spread, nearly straight, the tip narrowly rounded (Fig. 2). The transverse sulci of the pronotum are shallow and obscure.

Length, pronotum, male, 5; female, 5.5; elytra, male, 34; female, 35.5; posterior femora, male, 21; female, 21.5; subgenital plate, male, 13; ovipositor, 18; width, pronotum, male, 6; female, 6; elytra, male, 18; female, 14; subgenital plate, male, 2.25; ovipositor, 3.25 mm.

Type no. 9137, U. S. National Museum.

One male, Biloxi, Mississippi (Alice Tracy); one female, Wellsboro, Texas (N. Banks). July 18, 1903.

This seems to be a southern species. It appears unquestionably distinct, not being referable to either of the allied species. The female is especially closely allied to some of the females of *C. oblongatus* in which the anal margin of the elytra is less convex than the costal margin. The elytra of this species must be spread to properly exhibit the shape, the straight anal margin not being obvious when the elytra are folded.

## Genus LEA, new.

Color green with brown or yellowish tints. Form more elongate than usual in the other United States generæ. Vertex as in *Cyrtophyllus* but the head is narrower. Pronotum about one and one half times as long as the middle width, twice as long as the interior width; lateral lobes one and one half times as long as high and meeting the disk in a distinct angle, forming subpersistent lateral carinæ, the disk somewhat rugose and crossed by two distinct, but not conspicuous, sulci, the posterior one a little behind the middle. Legs about as in *Cyrtophyllus*, all the femoræ and tibiæ spined below and the middle and posterior tibiæ above, the anterior ones unarmed dorsally but, like the rest, is flat, with acute margins. Elytra two and one half times as long as the middle breadth, both margins equally curved, apically broadly rounded, the anterior field with the veins regular and parallel as in *Cyrtophyllus*; wings broad, about as in *Cyrtophyllus*. Supraanal plate, at least of the female, slightly more than twice as long as the middle breadth, apically narrowly rounded. Cerci of the male furcate, the branches round and simple, parallel and subequal in length; of female cylindrical, apically pointed and briefly bifid, forming two minute brief branches; subgenital plate of the male similar to that of the allied genera but is more distinctly furcate apically, the two halves more distinctly separated. Ovipositor essentially as in *Cyrtophyllus*, but curving somewhat more abruptly upwards.

Type *Cyrtophyllus floridensis* Beutenm.

This genus, while related to its allies, has a very distinctive appearance. The elongate pronotum with its subpersistent lateral carinæ and elongate lateral lobes and the generally more elongate form easily distinguish it from the two allied genera. It is much more nearly allied to *Cyrtophyllus* than it is to *Paracyrtophyllus*, as exemplified by the shape of the wings and the dorsally unspined anterior tibiæ; the shape of the cerci of the male however, as shown in the figure, seems to be more like that of *Cyrtophyllus*. All the male characters of the above description were taken from the printed description and figure referred to below. We have but one species:

**Lea floridensis** Beutenmueller. (Text fig. and Pl. I, fig. 5.)

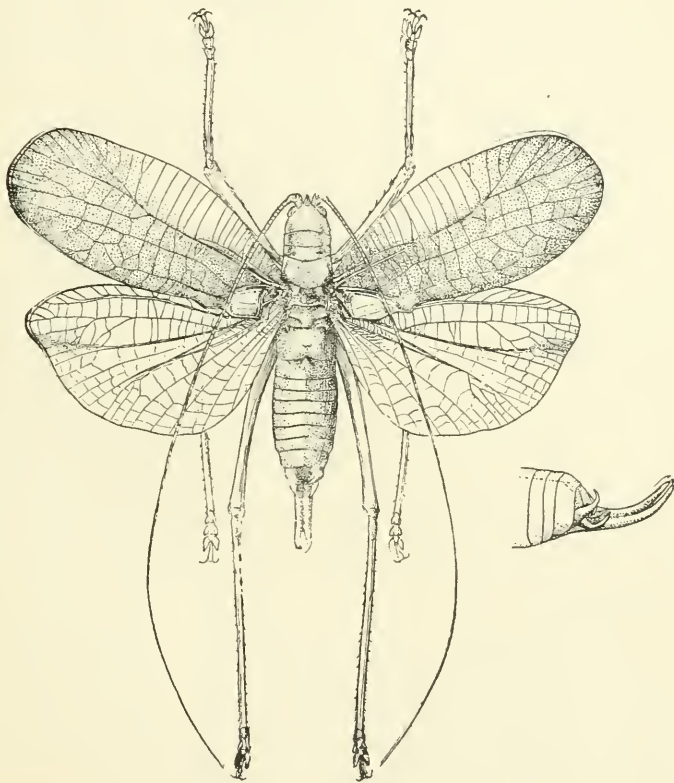
*Cyrtophyllus floridensis* Beutenm., Bull. American Mus. Nat. Hist., xix, 637, fig. 3 (1903).

The single male, the type, is the only specimen of that sex known. It is described by the author as follows: "Color — Head and thorax light gray, with a tinge of green. Wing-cases green-gray. Legs greenish, basal half of femora pinkish. Head large, stout; eyes hemispherical, rather small. Vertex with a short spine, rounded at the tip, grooved on top. Antennæ twice as long as the body. Pronotum longer than broad on top, with two transverse furrows; lateral carinæ rounded to the second transverse furrow, thence rather sharply defined to the hind edge; lateral lobes a little narrower at the lower part than at upper; anterior angle acutely rounded; hind angle well rounded. Wings concave. Wing-covers longer than the hind wings, almost three times as long as broad, and almost of equal width; apex



rounded. Legs very long, spinulate. Subanal plate very long, curved upwards, grooved above and below, furcate at the tip. Abdomen with a prominent spine on top of the second segment. Stridulating organs similar to those of *Cyrtophyllus perspicillatus*.

*Measurements*.—Length of body 43 mm. Length of wing-covers, 37 mm.; width, 13 mm. Length of pronotum on top, 8 mm. Length of anterior femora, 17 mm.; middle femora, 15 mm.; pos-



*Lea floridensis* Beut. ♂. (After Beutenmüller.)

terior femora, 28 mm. Length of anterior tibia, 15 mm.; middle tibia, 14 mm.; posterior tibia, 30 mm.

*Habitat*.—Indian River (opposite Grant), Florida.

Described from a single male taken in July. Type, coll. Am. Mus. Nat. Hist.



One female from Florida, undated and without specific locality, is before me. It may be described as follows: Color green with head, thorax, legs and part of the elytra more or less yellowish brown, the disk of the pronotum, next the rounded subpersistent lateral carinae, reddish: when living the insect is probably for the most part green, at least the elytra. Pronotum straight above, roughened, the disk twice as long as the anterior width, crossed at the anterior third by an inconspicuous straight sulcus and just behind the middle with a posteriorly bowed sulcus, a little more distinct than the anterior one (Fig. 5). Elytra equally rounded before and behind, the tip broadly rounded, the whole two and one half times as long as broad, the veins of the anterior field weak; legs moderately stout.

Posterior femora armed below on the outer carinae with seven or eight spines, and the middle ones anteriorly with five spines; anterior femora armed below on the inner side only with five spines. All the tibiae armed below with a number of spines on both margins, the posterior and intermediate ones also armed above for nearly the entire length, the posterior ones on both margins and the intermediate ones only on the inner; anterior tibiae unarmed above. Supraanal plate thin and flat, more than twice as long as the middle width and apically somewhat narrowly rounded. Cerci cylindrical, curving gently inwards and upwards, not quite extending to the tip of the supraanal plate and apically tapering and briefly forked, forming two pointed apical teeth; ovipositor of the general form found in *Cyrtophyllus* but curving somewhat more abruptly upwards, apically serrate below, the serrations very fine.

Length, pronotum, 7.25; anterior femora, 13; hind femora, 25; elytra, 34; ovipositor, 17; width, pronotum, 6; at the anterior margin, 3.25; elytra, 13.5; ovipositor, 3.25 mm.

This species is said by Mr. Beutenmueller to live in the tops of live-oak. He says the note of the male is a continuous "Kerr-kerr-kerr-kerr" with about one second interval of rest. It is not rare on the subtropical strip of land dividing the mainland of eastern Florida from the Ocean. It is not at all allied to the *Cyrtophyllus crepitans* Redt., of the West Indies.

Mr. Rehn has taken a number of this species at Pablo Beach, Fla.

#### EXPLANATION OF PLATE I.

1. *Paracyrtophyllus robustus* Caud. ♂.
2. *Cyrtophyllus intermedius* Caud. ♀ (elytron).

3. *Cyrtophyllus perspicillatus* Fabr. ♀ (elytron).
4. *Cyrtophyllus perspicillatus* Fabr. ♂ (head and pronotum).
5. *Ilea floridensis* Beutenm. ♀ (outline of disk of pronotum from above).
6. *Paracyrtophyllus robustus* Caud. ♂ (cercus, from side).
7. *Cyrtophyllus perspicillatus* Fabr. ♂ (cercus, from side).
8. *Cyrtophyllus intermedius* Caud. ♂ (cercus, from side).
9. *Cyrtophyllus furcatus* Caud. ♂ (cercus, from side).

## Class I, HEXAPODA.

### Order XIII, MALLOPHAGA.

#### MALLOPHAGA FROM ARGENTINA.

BY VERNON L. KELLOGG,  
STANFORD UNIVERSITY, CALIF.

(PLATE II.)

A small lot of Mallophaga taken from birds of Argentina (South America) was sent me in 1902 by Dr. Carlos Berg, of Buenos Aires. In recently going over this lot I find it to consist of the following nine species, of which seven at least are new and are described and figured herewith.

#### **Eurymetopus taurus** Nitzsch.

Several specimens from *Diomedea regia*.

#### **Goniodes** sp.?

Two specimens of a large and unusual species of *Goniodes*, without any host reference.

#### **Lipeurus bergi**, new species (Pl. ii, Fig. 1).

Males, females and young from *Guira guira* (Argentina).

*Description of Female.*—Body, length 2.7 mm., width .55 mm.; slender; strongly marked with light brown regular blotches and bands.

Head, length .55 mm., width .4 mm.; elongate, conical, with rather narrow clypeal front which is very weakly concave; two hairs in anterior angles and other short ones on lateral margins near trabeculae; trabeculae colorless; eyes prominent, with black pigment and a prickle; temporal margin convex, with two long hairs and two spines; occipital margin nearly straight, with two spines along posterior angles; signature transparent; ground color pale brown; antennae and occipital bands brown, temporal margin dark brown, two brown spots along occipital margin between the occipital bands.

Prothorax almost square, with posterior margin very slightly angulated on the metathorax; one long hair on each posterior angle; transparent in middle, with dark

brown lateral margins. Metathorax a little longer than wide, sides diverging, posterior angle rounded; posterior margin with three long pustulated hairs and one small hair at the posterior angle. Legs large, slender, dark brown markings on the margin.

Abdomen elongate with two or three long hairs in posterior angle of each segment; segment 4 widest, segment 5 slightly narrower than 4, and segments 7 to 9 narrowing more rapidly; segment 9 deeply angularly emarginated, the points acute, and bearing many fine curved hairs on the inner margin; narrow marginal dark brown bands and two quadrangular lateral blotches on each segment, each blotch with a clear stigmal spot in center; the blotches distinctly separated from each other and from the lateral submarginal uncolored space.

*Male*. — Body, length 1.7 mm., width .37 mm., head, length .6 mm., width a little over .3 mm. General color very much lighter than that in the female; first antennal segment longer than second, third, fourth and fifth together; abdomen with parallel sides; legs remarkably large.

**Lepeurus argentinus, new species** (Pl. ii, Fig. 2).

Females from *Plegadis guarana* (Argentina).

*Description of Female*. — Body, length 2.5 mm., width .33 mm.; very elongate and slender; parallel-sided; color, very pale with margins of head between antennæ and sutures golden yellow; thorax and abdomen with pale yellow markings.

Head, length .5 mm., width .36 mm.; elongate conical, with clypeus expanded; one lateral hair on expanded clypeal portion, one long hair in front of the suture, one at the suture, and two rather weak hairs between antenna and suture; trabeculæ small, transparent; temporal margins slightly convex, with four or more short spine-like hairs; occipital margin nearly straight with two hairs in posterior angle; eyes conspicuous with black pigment; antennæ with second segment longest, fifth next to longest, segment 4 shortest, segments 1, 3, and 4 are subequal; clypeal signature shield-shaped, extending to front margin of head, pale brown, with distinct suture extending from posterior angle along the median line not quite to the anterior margin of signature; antennal bands golden brown, distinct; temporal margin pale yellow; occipital margin uncolored.

Prothorax almost square; posterior margin nearly straight, with three spines in posterior angles; lateral margins pale yellow. Metathorax quadrangular, longer than broad, slightly narrowing anteriorly; posterior margin straight, with five long and one short hairs in each posterior angle; lateral margin pale yellow. Legs large, pale yellowish markings on the margin.

Abdomen elongate; first segment slightly narrower than thorax at articulation, segments gradually widening to the fifth and narrowing from there to the ninth; segments 1 to 8 with four hairs on dorsal surface near posterior margin; segments 1 to 7 with one weak hair in posterior angles, segments 8 and 9 with two long and one short hairs; segment 9 with rounding emargination on posterior margin; segments 1 to 9 with very pale narrow marginal bands, and two quadrangular pale yellow blotches separated from each other and from lateral band by uncolored space.

**Goniocotes abnormis, new species** (Pl. ii, Fig. 3).

Males and females from *Ava chloroptera* (Argentina).

*Description of Female*. — Body, length 1.75 mm., width .55 mm.; pale with

dark brown markings; temporal margin rounded instead of angulated as usual in this genus.

Head, length .4 mm., width .47 mm.; front narrow, rounded, with eight spines; antennae in shallow emargination with first segment stout and longest, second segment almost as long as first, third, fourth and fifth subequal; temporal margin flatly rounded with one long hair and four prickles; occipital margin concave in middle, with two spines and one long hair in the posterior angle; pale yellow with golden yellow narrow marginal frontal bands ending posteriorly on each side in an expanded dark brown spot inside of antennal emargination; mandibles and oesophageal sclerite dark brown; eyes flatly convex with two spines; an irregular, brown ocular blotch behind the eyes.

Prothorax very narrow, about one half of the width of the head, almost quadrangular; posterior margin flatly convex; one long hair in posterior angle; posterior angles dark brown. Metathorax with blunt lateral angles, each middle of lateral margin with one spine; posterior angles with two hairs; posterior margin obtusely angled on abdomen, and bearing six long hairs. Legs rather small, pale; claws pale brown.

Abdomen elongate elliptical, segments 1 to 4 with one short hair in posterior angles, segments 5 to 8 with two long hairs in posterior angles; dorsal surface with four long hairs in transverse series on each segment near posterior margin; ground color whitish with distinct narrow lateral bands, darkest on anterior segments, distinct transverse blotches, each, with a clear stigmal spot in center, in segment 1 to 7 are separated by a transparent white median space; segment 8 wholly colored, segment 9 with very weak rounding emargination on posterior margin.

*Male*. — Body, length 1.3 mm., width .5 mm.; head, length .33 mm., width .43 mm., first antennal segment very large; abdomen broadest at segment 5; elongate-oval; segments 1 to 7 with entire transversal abdominal bands, segments 8 and 9 wholly colored; genitalia distinct, barely chitinated, dark brown in color.

***Colpocephalum guirænsis*, new species (Pl. ii, Fig. 4).**

Males and females from *Guira guira* (Argentina).

*Description of Female*. — Body, length 2.7 mm., width 1 mm.; pale yellow with brown border on the thorax; prothorax small.

Head, length .41 mm., width .73 mm., semilunar with flatly-rounded front, shallow ocular emarginations, and rounded posterior angles; occipital margin concave; palpi projecting by the length of the last segment, the antennae when outstretched also projecting beyond the margin of head by the length of the last segment; two pairs of spines in the middle of front, one short hair on side followed by two long ones; the ocular fringe composed of many short prominent hairs; temporal margin with three long and about half a dozen short hairs; occipital margin concave, bare; a small, black ocular fleck; the mandibles black-tipped.

Prothorax small, shorter than broad, lateral angles obtuse, produced, and with a long hair and spines; on rounded posterior margin a row of long hairs; color pale brown with brown lateral borders. Metathorax, sides with many short spines; posterior angles with two strong hairs; posterior margin with a row of spiny hairs, anterior angles brown. Legs, large and concolorous with body.

Abdomen broadly elliptical, one long hair and several spines in each posterior angle, and a series of many short hairs along posterior margin of each segment; color

paler at sutures; ninth segment broadly rounded behind with narrow transparent margin thickly set with a fringe of short, sharp-pointed transparent hairs.

*Male*.—Body, length 2.5 mm., width .9 mm.; head, length .4 mm., width .73 mm.; abdomen narrower than female; genitalia distinct, projecting chitin bar reaching second segment.

***Colpocephalum burmeisteri*, new species** (Pl. ii, Fig. 5).

Males and females from *Ara chloroptera* (Argentina).

*Description of Female*.—Body, length 2.2 mm., width 1.3 mm.; slender; well marked with entire transversal abdominal blotches with wide, whitish intersegmental spaces and dark brown, narrow lateral bands.

Head, length .33 mm., width .55 mm.; front flatly rounded, with slight rectangular orbital emargination; about five short hairs on each lateral margin of forehead and two long and three longish hairs in region just in front of orbital emargination; the palpi projecting as also the antennae; temples narrow, two long hairs and at least four short hairs; occipital margin concave; general color yellowish brown, with narrow blackish occipital border and blackish curving ocular blotches.

Prothorax rather small, wider than long; lateral angles obtuse with three spines; posterior margin, from angle to angle, making a flattened semicircle and bearing eight hairs; general color yellowish brown, regions of lateral angles distinctly darker, transverse chitin band transparent, narrow, with a spine rising from each extremity; curving chitin bands at extremities of the transversal bar distinct, narrow. Metathorax with nearly straight posterior margin, and a series of hairs along the margin; lateral margins with six spines; posterior angles with two hairs and three spines; lateral margin with several spines. Legs rather large with marginal markings.

Abdomen long, slender, widest at segments 2 and 3; segments 1 to 6 with a long hair in the posterior angle, segments 7 to 9 with two or three long hairs; dorsal surface of each segment with a transverse thickset row of uncolored hairs near the posterior margin; all segments with distinct dark brown lateral margin.

*Male*.—Body, length 1.9 mm., width .55 mm.; head, length .33 mm., width .5 mm.; posterior end of last abdominal segment flatly rounded; genitalia distinct, the long chitin bar extending to the third abdominal segment.

***Læmobothrium caracarænsis*, new species** (Pl. ii, Fig. 6).

Males and females from a Caracara eagle, *Polyborus tharos* (Argentina).

*Description of Female*.—Body, length 6.5 mm., width 2 mm.; strong and distinct lateral margins and paired median dark brown blotches on abdomen; a finely marked species.

Head, length 1.13 mm., width 1.2 mm., ocular emargination very prominent, front straight; each side of the middle with two long and three short marginal hairs: two strong hairs at the angle; two terminal segments of the palpi projecting beyond lateral margin of the front; temporal margin slightly angulated; eyes double, conspicuous; mandibles brown, with teeth dark brown; distinct dark brown band along posterior and lateral margins.

Prothorax, with distinct lateral angles, in apex of which two long hairs and three spines; two more long hairs and many spines along posterior lateral margins; ground



color pale with dark brown margin and darkish-brown longitudinal blotches separated from each other by a narrow uncolored space. Metathorax longer than wide, lateral margin with many spine-like hairs; a transverse row of pustulated hairs near posterior margin; lateral margin dark brown, two subtriangular blotches separated from each other by a narrow median uncolored line; anterior corners black-brown. Legs very large, distinctly marked.

Abdomen, large, lanceolate in form, one or two long hairs on the postero-lateral angles of each segment; and short hairs along lateral margins; a row of postulated hairs on the posterior margin of each segment; marginal bands dark chestnut brown and two quadrangular blotches narrowly but distinctly separated from each other and more widely from the lateral bands by uncolored space; posterior margin of the last abdominal segment pointed.

*Male*.—Body, length 5.5 mm., width 1.5 mm.; head, length 1 mm., width 1.05 mm.; abdomen slenderer than in the female, last segment parabolic in form with several weak hairs along the margin; clear space down the median line separating the abdominal blotches, not so distinct as in the female, and wanting in the last three segments.

**Menopon argentinus, new species** (Pl. ii, Fig. 7).

Females from *Chrysomitris icterica* (Argentina).

*Description of Female*.—Body, length 1.2 mm., width .43 mm.; pale yellow, head and thorax slightly darker; abdomen with pale brown transverse blotches.

Head, length .27 mm., width .35 mm.; semilunar with evenly rounding front, shallow ocular emarginations with rounded posterior angle; occipital margin concave; palpi projecting by the length of the last segment; a pair of minute hairs in middle of front, a longer one on side followed by a very short one, and then three long ones in front of the emargination; the ocular fringe composed of rather strong hairs; temporal margin with three long hairs, two more on occipital margin of the produced temples; two long hairs along middle of the occipital margin; a small, black, ocular fleck and dark brown ocular blotch.

Prothorax subquadrangular, posterior margin convex with six longish hairs, and three spines along middle of the lateral margin; latero-posterior corners angulated. Meso- and metathorax fused, although the line of fusion is marked by a lateral emargination and by an indicated transverse suture; posterior angle with one long hair and three spines; the straight posterior margin with four marginal hairs. Legs stout, with dark brown marginal markings.

Abdomen obovate in form, widening posteriorly to segment 3; segment 4 a little narrower than segment 3, and segment 5 and 9 narrowing more rapidly; segments 1 to 7 with two or three long spines on lateral margin; with pale brown lateral bands and very pale transverse blotches.

EXPLANATION OF PLATE II.

FIG. 1. *Lipeurus bergi* Kell.

FIG. 2. *Lipeurus argentinus* Kell.

FIG. 3. *Goniocotes abnormis* Kell.

FIG. 4. *Colpocephalum guiransis* Kell.

FIG. 5. *Colpocephalum burmeisteri* Kell.

FIG. 6. *Læmbothrimum caracaransis* Kell.

FIG. 7. *Menopon argentinus* Kell.



JOURNAL  
OF THE  
New York Entomological Society.

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EDITED BY HARRISON G. DYAR.

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Publishes articles relating to any class of the subkingdom Arthropoda, subject to the acceptance of the Publication Committee. Original communications in this field are solicited.

EDITORIAL.

Our criticism of a work by Dr. Henry Skinner (Journ. N. Y. Ent. Soc., xiii, 217, 1905) has brought a rather hysterical reply (Ent. News, xvi, 217, 1905), which we should not notice, except that it attempts a misrepresentation of our Review of the Hesperiidæ (Journ. N. Y. Ent. Soc., xiii, 111, 1905). Dr. Skinner cites two errors. We presume that he is right in both cases; the mistakes can be easily corrected by transferring *manataaquæ* to *Thymelicus* and proposing a new name for *Atrytone* Dyar (not Scudder). This does not bear at all upon the question of generic classification, which is the real issue. Dr. Skinner claims to have studied the genera. We fail to see any evidence of it in his remarks, which are actuated only by a consideration of specific values. When Dr. Skinner gives us some original work based on structural characters, we shall begin to believe that his study of genera has been more than an opinionated attempt to discredit them.

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To refer to Mr. Prout's remarks in our last issue, advocating the "historical method," or rule of the first reviser in the fixation of generic types, we presume the weakest point in his argument is shown by the phrase "given the literature." The trouble is that the literature is not given. President David Starr Jordan (*Science*, n. s., xxii,

598, 1905) finds further objection to the first reviser rule. He says: "The objection to it is that no one has yet defined the first reviser so as to separate his rights from the rights of different meddlers." Mr. Prout would except faunal lists; but why except anything? The only way to have any definiteness is to include the "meddlers" on the same basis as the "reviser" and take as type the one first mentioned by anybody. This would involve even more of what President Jordan calls "otherwise profitless labor in bibliography" than following the first reviser, for it would mean the examination of all literature for some stray mention of a genus and typical species. No doubt this is asking too much; we fear there is no fixity or uniformity in the "historical method." Lord Walsingham, we believe, has expressed the opinion that a writer should know the literature of his subject. If there were any way of knowing that this desirable condition had been attained, we should cordially endorse the view; but even the best posted author is liable to discover accidentally some overlooked reference that may vitiate his carefully constructed historical system. He is always in a position of uncertainty.

We return to the method of first species as the only one promising fixity. President Jordan says: "The method of beginning with a leading species or *chef de file* as typical representative of each genus, to be described in full while the others were disposed of in comparative sentences, was adopted by Lacépède, Cuvier, Valenciennes, Poey and other authors. In Ichthyology this has given reason for the choice of the type of the genus by page precedence. This method was raised to the dignity of a universal rule by Dr. Bleeker and others. It is a pity it was not adopted earlier, for it would have given fixity, a matter which in nomenclature far outweighs all others." The objections to the method are, we believe, two. The first is that it would change many of the names now in use; the second that Linnæus and others usually placed their typical species in the middle of the series and the less known or aberrant ones at the ends. To obviate these we suggest that in the case of Linnæus and other authors definitely known to have used his method, the *central* species be taken instead of the first. These authors would have to be enumerated in the rule and all others held to the first species as type. But unfortunately, a glance over Linnæus' tenth edition shows that this would be no solution of the problem, for taking the middle species as type is not more in consonance with modern ideas than taking the first. In fact, in the Coleop-

tera, to take the first species uniformly as type would cause considerably less change in the present classification than to take the middle species. In the Lepidoptera, either course would cause a very radical change, about equal in either case. It has been proposed to cite as type of the Linnæan genera the common European species included under each. This is objectionable, because it is not capable of general application, as there are some groups without any common European species and others with two or more.

We are reduced therefore to squarely favor the first species method. Let us make what changes this requires now, which are perhaps not so many, and have the names finally settled on a permanent basis.

### BOOK NOTICES.

*The International Code of Zoölogical Nomenclature as Applied to Medicine.* By CH. WARDELL STILES. Bulletin No. 24 of the Hygienic Laboratory, Treasury Department, Public Health and Marine-Hospital Service of the United States. Washington: Government Printing Office. 1905.

This very important paper presents the international code in available form with explanatory comment by the author, who is well qualified to explain the code, being the secretary of the permanent committee of the International Zoölogical Congress. There are 36 articles and a valuable appendix giving rules for the transcription of Greek words and geographic names to be in Latin form. These rules would be more valuable if there were any obligation in the code itself to respect them, which there is not. Unfortunately the code does not embody the recommendations which we have urged in editorial comment in this Journal and in an article with Mr. Caudell on the types of genera (Journ. N. Y. Ent. Soc., XII, 120, 1904). We object to articles 4, 5, 14, 25 and 30.

Articles 4 and 5 do not go far enough. They state how the family name shall be formed, but do not tell us how to select the type genus. Is it to be the oldest one, or the one first selected historically? When changed, why should the name not go to the next oldest one (as advocated by us), or to the one next used for family type historically, rather than to the substituted name (as advocated by article 5)?

Article 14 states that specific names in adjective form must agree

in gender with the generic name. We object to this. It is perhaps easy to determine the gender of the old classical Latin names, but not so those of Latinized Greek or barbarous generic names. Of these there are already more than the pure Latin names, and we shall have an increasingly larger proportion in the future. We regard it as far simpler to write the specific name exactly as first proposed.

We would note that by article 25 the definition of a genus by citation of type, without description, seems accepted, the rule stating that a name must be published, accompanied by an *indication* or a definition or a description. But, as this applies also to specific names, we object, on the ground that an "indication" is not a sufficient specific description.

Article 30 tells us how to determine the types of genera. This is the most complicated set of recommendations we have seen. Both the methods of elimination are endorsed, although it has been shown that they are contradictory in their results, while the method of first species is not even mentioned. We defy any two workers to arrive at the same type for any complicated genus by using these rules and working independently. If the recommendations and the discussion be cut off, the rule itself is simple enough, being the plain historical method advocated in these pages by Prout. The discussion here only confuses an originally simple proposition; but it serves to show into what shape an apparently simple proposition can be twisted, and is a valuable exposition, we should say, of what not to do.

With these exceptions we find this presentation of this most recent code to be excellent. We infer that the publication is generally available from the statement that it will be sent to "nonpublishing societies and individuals in case sufficient reason can be shown why such societies or individuals should receive it," which statement we find on the cover. Application should be made to the Surgeon General, U. S. Public Health and Marine-Hospital Service, Washington, D. C.

*Monograph of the Bombycine Moths of North America*, including their transformations and origin of the larval markings and armature. Part II. Family CERATOCAMPIDÆ, Subfamily CERATOCAMPINÆ. By ALPHEUS SPRING PACKARD. Memoirs of the National Academy of Sciences, vol. ix, pp. 1-149, plates I-LXI. 1905.

This valuable work gives, in a wealth of detail, the life histories of

our Ceratocampids, together with some South American forms. The work has been completed after Dr. Packard's death, which perhaps accounts for a certain disjointed air and for sundry strange statements, such as one we find in the explanation of plates, where a figure purports to represent the "newly hatched larva in stage V." Dr. Packard has gone extensively into the phylogeny and relationships of the group, and has arrived in many respects at sound results. We find ourselves more in accord with his views than we had anticipated would be the case. We cannot, however, be expected to acquiesce in the impossible derivation of the Citheroniidæ from the Notodontidæ which is set forth. Likewise we dissent from the relationship claimed for the Sphingidæ. Dr. Packard quotes and confirms our statements as to the differences in structure of these groups, yet fails to draw the necessary conclusion that they are unrelated. A full life history of the Sphingid *Ceratomia amyntor* is given. Some new species are described, which must be verified, as we believe Dr. Packard was possessed of but slender South American material. We particularly commend the many beautiful plates drawn by Mr. L. H. Joutel and those photographed by Mr. A. H. Verrill, although, by some misfortune, all the larvæ are represented as resting on the branch *above*, a position that no living larva of this size does, or could possibly maintain. It is with the greatest regret that we realize this to be the last of the Bombycid monographs, as the learned author has passed from among us.

## PROCEEDINGS OF THE NEW YORK ENTOMOLOGICAL SOCIETY.

MEETING OF FEBRUARY 21, 1905.

Held at the American Museum of Natural History.

President C. H. Roberts presided with eight members and three visitors present.

Mr. Barber proposed Mr. Edgar L. Dickerson of Newark, N. J. as an active member of the society.

On motions the by-laws were suspended and the secretary instructed to cast a single ballot in favor of the election of Mr. Dickerson at the present meeting.

The resignations of Mr. G. A. Billings and C. T. Brues as active members were accepted by the society with regrets.

On motion of Mr. Davis the secretary was requested to address letters of sympathy to Mrs. A. S. Packard and Mrs. Annie Trumbull Slosson on behalf of the society.

The librarian, Mr. Shaeffer reported the receipt of the following exchanges:

Verhandl. d. k. k. Zool. Bot. Gesellschaft, LIV, Nos. 8 and 9.

Proc. Amer. Philos. Soc., XLIII, No. 177.

- Proc. Amer. Acad. Arts and Sci., XL, No. 10.  
Relatorio du Directoria Soc. Sci. de S. Paolo.  
Proc. Canad. Inst., N. S., Vol. II., No. 12, Pt. 6.  
Springfield Mus., Nat. Hist., Bull. No. 1.  
Canad. Ent., XXXVII, Nos. 1 and 2.  
Wien. Ent. Zeit., XXIII, Nos. 8, 9 and 10.  
Proc. Davenport Acad. Sci., Vol. IX.  
Stett. Ent. Zeit., Vol. 65, Hft. 2.

Mr. Leng spoke of "Collecting on Mt. Whiteface in the Adirondacks." He gave an account of his collecting experiences, with a general description of the locality, and named some of the more conspicuous species of Coleoptera taken, among which were: *Cychrus brevoorti*, *C. canadensis*, *C. leonardi*, *Pterostichus punctatissimus*, *P. luezzatii*, *P. mandibularis*, *Trechus chalybeus* and *Platynus 4-punctatus*. All of the insects taken near the summit were distinctly northern species, otherwise known from Hudson Bay and British America.

Mr. Bueno read a paper on the genus *Notonecta*, stating that of the twenty described species, twelve are peculiarly American and the thirteenth extends entirely across the palearctic region through Europe, Asia and in North America down through British Columbia. Eleven of these thirteen species are to be found within the United States. He discussed the structural and color peculiarities of these eleven species as well as their habitat.

#### MEETING OF MARCH 21, 1905.

Held at the American Museum of Natural History. President C. H. Roberts in the chair, with twelve members in attendance.

The librarian, Mr. Schaeffer, reported the receipt of the following exchanges:

- Entomol. Tidskrift, 1904, Vol. XXV, Nos. 1-4.  
Allgem. Zeits. f. Entom., Vol. IX, Nos. 23 and 24.  
North Carolina Dept. of Agric. Div. of Ent. Circulars, Nos. 13 and 14.  
Zeits. f. Wissenschaft. Insectenbiologie, Vol. I, Nos. 1 and 2.  
Mus. Brooklyn Inst. Sci. Bull., Vol. 1, No. 4.  
Zoöl. Record, 1903. Insecta by Dr. Sharp.  
Wien. Ent. Zeit., XXIV, Nos. 1 and 2.  
Canad. Ent., XXXVII, No. 3.

President's Report of the Univ. of Montana for 1903 and 1904.

The secretary reported that the New York Academy of Sciences had granted permission to the society to place suitable book cases in their meeting room.

The secretary read a communication from Dr. J. B. Smith, requesting the society to coöperate in organizing a National Entomological Society, and to elect a delegate to represent its interests.

Mr. C. Schaeffer was elected as such a delegate.

The resignation of Mr. E. A. Bremser as an active member was accepted with regret.

The society had the pleasure of listening to a very instructive lecture by Dr. E. P. Felt on the "Structure of the Culicidæ," illustrated by numerous interesting lantern slides.



## MEETING OF APRIL 18, 1905.

Held at the American Museum of Natural History. President C. H. Roberts in the chair with nine members present.

Mr. Leng read a paper on "Collecting in the Pine Woods of North Carolina." He and Mr. Harris arrived at Southern Pines, N. C., on the 25th of March and collected in that vicinity for three days. In his description of the country Mr. Leng stated that it was much like Lakehurst, N. J., but not so flat. The weather was warm and the fruit trees were all in full bloom. Butterflies and cicindelas were flying plentifully. A striking feature of the landscape was the peculiar long-leaved pine with its great bunches of mistletoe. Most of the tiger beetles noticed belonged to three species: *unicolor*, *vulgaris* and *repanda*, which were evidently hibernating specimens judging from their condition. Mr. Leng exhibited the collection which was made on the trip.

Mr. Schaeffer stated that because of the great activity of the coleopterists, new and additional material is being secured which helps to clear up doubts, correct mistakes, and also in many instances overthrows even recent synopses of genera or families. As an illustration he exhibited eight or nine species of *Anomala* which had been found in Arizona, New Mexico and Texas which are new to our fauna; some of them known Mexican species and three entirely new, bringing the number of species up to twenty. He further remarked that *luteipennis* of Leconte was in his opinion attributed to the wrong insect as the "pygidio parcius, sat grasse punctato" does not fit the pale specimens of *binotata* from Texas and Arizona, but those specimens of *flavipennis*, which are metallic green and have the elytra testaceous, occurring in Texas, agree much better with the description. The pale form of *binotata*, regarded by Dr. Horn and others as *luteipennis*, and revived by Major Casey and Dr. Ohaus to specific standing, he thinks, as did Dr. Horn, that it is impossible in a moderately large series to retain it even as a variety. The type of *innuka* of Fabricius, of which Dr. Horn was in doubt, as well as Burmeister's type of *minuta*, were examined by Dr. Ohaus, and the good description of both given by the latter enabled Mr. Schaeffer to correctly identify both species, and that what we have called *minuta* is *innuka*; the true *minuta* belongs to the subgenus *Rhomhonyx* and are, in his opinion, undoubtedly those darker forms of *semilivida* mentioned by Dr. Horn in his paper.

H. G. BARBER,  
Secretary.

# THE NEW YORK ENTOMOLOGICAL SOCIETY.

Organized June 29, 1892.—Incorporated June 7, 1893.

The meetings of the Society are held on the first and third Tuesday of each month (except June, July, August and September) at 8 P. M., in the AMERICAN MUSEUM OF NATURAL HISTORY, 77th Street and Eighth Ave.

Annual dues for Active Members, \$3.00.

Members of the Society will please remit their annual dues, payable in January, to the treasurer.

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<i>Librarian</i> , C. SCHAEFFER, . . . . .	Museum, Eastern Parkway, Brooklyn N. Y.

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# Price List of Entomological Publications

*For Sale by the New York Entomological Society.*

- LINELL, MARTIN L. A short review of the Chrysomelas of North America. 5 pp. 15c.
- CASEY, THOS. L. Studies in Ptinidæ, Cioidæ, and Sphindidæ of America. 32 pp. 75c.
- A revision of the North American Coccinellidæ. 98 pp. \$1.50.
- Review of the American Corylophidæ, Cryptophagidæ, Tritomidæ and Dermestidæ, with other studies. (Cuts) 121 pp. \$2.00.
- FALL, H. C. Synopsis of the species of Acmaeodera of America, north of Mexico. 36 pp. 90c.
- FALL, H. C. On the affinities of the genus Tachycellus with descriptions of new species. 10 pp. 20c.
- LENG, CHARLES W. Notes on Coccinellidæ, I, II. 31 pp., 3 pl. \$1.00.
- SCHAEFFER, C. Synopsis of the Species of Trechus, with description of a new species. 4 pp., 1 pl. 20c.
- WICKHAM, H. F. The North American species of Catalpa. 4 pp. 15c.
- FOX, WILLIAM J. Synopsis of the species of Nysson, inhabiting America north of Mexico. 7 pp. 20c.
- COQUILLETT, D. W. Synopsis of the dipterous genus Symphonomyia. 4 pp. 10c.
- Revision of the dipterous family Therevidæ. 6 pp. 15c.
- NEUMOEGER and DYAR. A preliminary revision of the Bombyces of America north of Mexico. \$1.50.
- DYAR, HARRISON G. A review of the North American species of Pronuba and Prodoxus. 3 pp. 10c.
- A revision of the Hesperiidæ of the United States. 32 pp. 60c.
- DYAR, HARRISON G. Synoptic table of North American mosquito larvæ. 5 pp. 10c.
- KEARFOTT, W. D. Revision of the North American species of the genus Choreutis. 20 pp. 50c.
- CAUDELL, A. N. The genus Sinea of Amyot and Serville. 11 pp., 1 pl. 35c.
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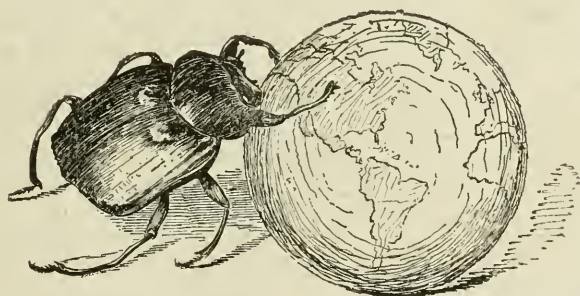
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Class I, HEXAPODA.

Order IV, DIPTERA.

GOELDI'S "OS MOSQUITOS NO PARÁ."

BY FREDERICK KNAB,  
WASHINGTON, D. C.

This handsome quarto by Dr. Emilio Augusto Goeldi, published as Memoir IV of the Museu Goeldi (Pará Museum), deals with the mosquitoes of Pará (Brazil). The species treated of are chiefly those that molest man, their biology and relation to hygiene and a large part of the work is devoted to *Stegomyia fasciata* and *Culex fatigans*, preëminently the town mosquitoes of the tropics. The 154 pages are replete with interesting data and suggestive ideas. The author throughout, is careful to distinguish between fact and theory, so that the volume is a highly inspiring one to students of this subject. The text is in Portuguese, unfortunately made difficult for those not proficient in the language, by a rich and picturesque literary style, which aims to be popular as well as scientific, and must certainly make it attractive to Brazilian readers. There are fifteen plates, with numerous figures, illustrating the life histories of the various species, and five very fine color plates figuring the imagos of fourteen species, in most cases of both sexes.

In this work are brought together the observations published under the same title in two previous bulletins (1902, 1904), augmented by a great deal of new matter, and detailed accounts of the early stages of most of the species considered, and in the fourth chapter is appended the paper on *Stegomyia fasciata* read before the International Congress of Zoölogists at Bern in August, 1904, and now translated from the

German into Portuguese. The book is divided into the following chapters: I, The mosquitoes of Pará considered as a public calamity; II, Review of results of experiments made in 1903, particularly with *Stegomyia fasciata* and *Culex fatigans*, from the sanitary point of view; III, Biological details; IV, *Stegomyia fasciata*, the transmitting mosquito of yellow fever and the actual state of knowledge relative to the cause of the disease. The author did not, however, bring all his data together under their respective headings, which is troublesome to the reader, but perhaps inevitable with such wealth of material.

The first chapter opens with an introduction to the Culicidæ, definition of some of the more important genera and data on the distribution of species culled from Theobald's Monograph. The author then turns to the species of Pará. Of the 42 species recorded from Brazil, 18 have been found at Pará, 17 of them by the author; five of these are new. This seems a very small showing for so favorable a locality; but this is perhaps due to the fact that the author has given most of his attention to the biologic and economic part of the subject. I will only mention in comparison that more than 50 species of mosquitoes are known from the Island of Trinidad, and indications are that it is by no means exhausted. The genera known from Pará are *Anopheles*, *Megarhinus*, *Psorophora*, *Janthinosoma*, *Stegomyia*, *Culex*, *Teniorhynchus*, *Sabethes*, *Hæmagogus*, *Wyeomyia*, *Limatus* and *Trichoprosopon*. A number of these genera are not treated in the present work, but the author promises an account of them in a future paper. Then follow short notes on some of the species. *Megarhinus separatus* is not rare in the vicinity of the city. It is strictly a forest mosquito and diurnal. Its bite is reputed to be painful, but the author has not yet been able to verify this from personal experience. *Janthinosoma*, of which the author has taken *J. musica*, is dismissed, as, in the author's experience, of no faunistic importance. This seems remarkable, as elsewhere in tropical America *Janthinosoma* is one of the most conspicuous forms. In connection with *Stegomyia fasciata* its excessive abundance in the city, its diurnal habits and severe bite are noted. In the reviewer's experience the bite of *Stegomyia* can hardly be called severe; indeed the bite is often hardly noticeable, and this, together with its stealthy habits, the more easily make it the transmitter of the dread yellow fever. *Culex fatigans* is spoken of as a horrible nocturnal scourge in certain parts of the city. *Teniorhynchus* is crepuscular, invades the dining room, flies onto the table and into

the plates. It alights leisurely and without ceremony upon the face and hands, and then bites painfully. It is of such a voracious disposition that it can easily be crushed without its attempting to escape. Of the beautiful *Sabethes*, with metallic colors and plumed tibiae, three species occur. They are diurnal forest mosquitoes and are sometimes common enough to become troublesome. They bite ferociously and leave a relatively intense inflammation, evidently due to the large dose of poison injected.

Of especial interest is the figure on Plate V, showing the attitude of *Sabethes longipes* in flight. The position of the hind legs, raised over the back and bent well forward, is characteristic of the entire subfamily *Sabethinae*—at least it holds good for the species of a number of genera that the reviewer has had opportunity to observe in nature. Those who have seen living specimens of *Wyeomyia smithii*, the only known representative of the group in the United States, will recall this very striking attitude, which has been described by Dr. J. B. Smith on p. 343 of his Report on the Mosquitoes of New Jersey (1904).

Turning now more particularly to the economic aspect of his subject, the writer states that four species are the most important in Pará, not only as physical torturers and destroyers of peace, but as a menace to health. Three of these have taken a firm footing within the city in the last few years and relieve each other in their daily attacks inside the house, greatly injuring the credit and reputation of Pará as a habitable tropical city. The fourth species holds the outskirts and vicinity and constantly threatens human existence in the swampy regions of the interior. Branded by modern science as the vehicle and transmitter of malarial fevers it constitutes a serious obstacle to the progress of the country and is directly guilty of serious injury to public prosperity. The mosquito last alluded to is *Anopheles* represented by *A. albipes*. The fearful abundance of this species at Macapá and in the region bordering Guiana, and coincident with this an epidemic of malaria, was observed upon two museum expeditions. The author convinced himself of the correctness of the popular statement that this mosquito has a strong predilection for forests of siriúba (*Avicennia*), and so numerous are they there that, even in passing through such woods in the daytime, the face and hands soon become black with them.

The second of the four above-mentioned important species is *Stegomyia fasciata*. The description of the insect, with an account of its distribution and its rôle in yellow fever, is followed by observations

upon the species in Pará. It is excessively abundant in houses and hovers over persons' heads in troops of four to ten or more. It bites from sunrise until evening and a person is bitten at least 50 or 100 times a day. Seeking out any uncovered part it inflicts its painful bite which afterward swells. There is not a minute of rest from day-break to nightfall; it is impossible to defend oneself against them and soon face, neck, hands and legs are covered with burning swollen points. The author exclaims, "I do not know of another factor in this city so hurtful and actually pernicious to intellectual work, to scientific study and investigation in the quiet of the cabinet and laboratory as this execrable creature which is called *Stegomyia fasciata*!" *Culex fatigans* follows in importance and insupportability as a nocturnal complement to the diurnal *Stegomyia*. Surprising, but perhaps after all not far from the truth, is the author's statement that he considers the nocturnal habit exceptional and that the majority of mosquitoes are diurnal. According to Dr. Lutz, *Culex fatigans* is the common nocturnal mosquito throughout Brazil, found everywhere and biting only at night. At Pará the abundance of this mosquito is simply astonishing; in the suburb of Nazareth it assaults the houses in clouds during the first hours of the night and fairly throws itself against the person. The hum of myriads of these mosquitoes, flying and in courtship, in a dark room is enough to make one's hair stand on end. "I am apprehensive each time I hear this odious music, when I think of the sad consequences to health, of which, in my firm conviction, it is the fatal precursor and messenger!" The writer here alludes to *Culex fatigans* as the transmitter of filariasis. While it is mostly the black race and its crosses that is persecuted by this disease there is great danger to everybody at Pará where black and white sleep without mosquito-bars in the same rooms, infested with this mosquito.

The fourth of the above-denounced mosquitoes is *Taniorhynchus fasciolatus*. While the author agrees with Dr. Lutz that this is a genuine swamp mosquito he adds that at Pará it enters the houses at twilight. Its bite is painful and it has a voracious disposition, yet it is ingenuous and phlegmatic, if not to say entirely stupid. The specimens observed at Pará differ from the colored figure in Theobald's work by their darker color, a circumstance which has already been noted by that author.

The biology of mosquitoes is next treated in a popular way and the differences in the early stages of *Culex*, *Stegomyia* and *Anopheles*

pointed out. A count of the eggs in two egg-boats of *Culex fatigans* gave respectively 270 and 225 eggs.

There is an interesting observation on the difference in food habits of the two sexes. Outdoors the males feed on ripe fruits and flowers; in the house they go to sugar, coffee, tea, wine, soups and all sweet substances, and abstain from sucking blood. The females are blood-suckers and the difference in food habits is brought out in the following experiments. In the first experiment mosquitoes were observed swarming about the sugar bowl. It was quickly covered with a paper cone and the mosquitoes within chloroformed. There were 37 dead mosquitoes — 1 ♂, 1 ♀ *Stegomyia fasciata*, and 33 ♂, 2 ♀ *Culex fatigans*. This experiment was repeated a number of times with only a slight variation in the percentage of the sexes. This was in the dining room, the second contrasting experience in the bed-room. Far in the night the author noticed that outside of a certain part the mosquito-bar, close to his face, the mosquitoes were dancing up and down in a manifest endeavor to find a hole that would admit them. With a sudden slap of the hand a number of them were crushed against the wall. Examination showed that there were 23 dead *Culex fatigans* — all females. And thus, in the bed rooms, there always proved to be an enormous majority of females in quest of blood, to the exclusion of the males.

An explanation of the blood-sucking habit is offered, as follows: Few readers, particularly in the tropics, have not had an opportunity to observe how any scratch or wound on exposed parts of the body is persecuted by a multitude of small flies and related insects which come to sip the blood-serum, a slightly sweetish substance. One also knows how, during dry periods, the margins of the eyes, for example in the large mammals, are persecuted by the same impertinent Diptera, attracted by the "aqueous humor" with which the eye-ball is moistened. Now all these small Diptera, in common with ordinary-sized one (*Stomoxys*, etc.) and other large ones like the Tabanids, indicate the path gone over by the hæmaphiles. The Culicids, primitively only sucking sweet juices, became acquainted with animal blood through the blood-serum of wounds. The males contented themselves with this, the females reached the point of intentionally perforating the skin to gain possession of the desired liquid. Seconded in this mission by a stouter beak better fitted for piercing than in the male, and thus taking advantage of the liquid so easily obtained to



gain strength for the demands of egg-production, a disposition to this proceeding would become a habit and normal, and finally an indispensable postulate. The sucking of blood, acquired accidentally as a secondary habit, becomes an essential factor in the mosquito's life in relation to the ripening of the sexual products of the female. Today these insects must have blood for the propagation of their species.

The description of the mating of mosquitoes is of great interest, as very little has been made known on this subject. The species observed is *Culex fatigans*, although the author fails to specify this. On a subsequent page, in the second chapter, he treats of the mating habits of *Stegomyia fasciata* and compares them with those of the present species. The swarms of *Culex* that enter the houses at night-fall in dense clouds are principally males which seek the females already there. The infernal music of innumerable mosquitoes assails one's ears and at the same time they dash against one's face. Striking light one sees the multitude dancing and cutting frantic capers. There are two swarms, one composed entirely of males, the other only of females. The sexes are guided towards each other principally by the song and one soon perceives that there are two sounds, the higher produced by the males, the lower by the females. The actual sexual union is wholly devoid of ceremony. Some female detaches herself suddenly from her companions and approaches the cloud of dancing males. Immediately she is seized by a male and united they retire from the swarm. It is not rare that such pairs forget all prudence and in their frenzy hit against everything and even roll upon the ground. In some cases a female is seized by two males at the same time and all three fall, rolling over each other in the fiercest sexual frenzy. Theobald says, "I have never seen a male *C. pipiens* or of any other European species indoors." In Pará the males of both *Culex fatigans* and *Stegomyia fasciata* daily invade the houses in swarms. Oviposition (of *Culex fatigans*?) is said to occur only at night. The observations on the localities where the eggs of *Culex fatigans* and *Stegomyia fasciata* are laid agree with those of Durham and Myers. *Culex fatigans* contents itself with any ditch, no matter how muddy or foul, puddles of waste water and drains, and is easily reared in the laboratory. *Stegomyia fasciata* is quite particular in the selection of breeding places. It prefers relatively clean water and is customarily found in the depressions of the horizontal rain-gutters on houses, in barrels, jars and other receptacles, in the still folded leaves of banana plants, the leaves of bromelias, etc. In captivity the

larvæ do not prosper in water containing other matter than their essential food, algæ and other cryptogams.

The paragraph on mosquitoes as agents of disease reviews what is now known on this important subject and briefly states the part taken by the different investigators in bringing out the facts. The species of mosquitoes that are known to transmit disease are enumerated and the diseases they carry. In the mention of *Filaria immitis* in the dog, transmitted by *Culex fatigans*, the writer states that he has found this disease in dogs at Rio de Janeiro and sometimes the left auricle of the heart is filled with a ball of these worms.

Under the caption "Practical results which urgently claim attention" the various methods of mosquito control are discussed. The baneful effect of mosquitoes is again emphasized, not only as direct agents of yellow fever and other diseases but also as the destroyers of spiritual peace and the producers of neurasthenia through the constant infliction of physical pain.

Chapter II gives a series of experiments with *Stegomyia fasciata* and *Culex fatigans* to ascertain the relation of meals of blood to copulation and to oviposition. Upward of 220 adults of both sexes of *Stegomyia fasciata* and 260 of *Culex fatigans* were used in these experiments. At first captured mosquitoes were used, but later the experiments were carried on with bred specimens. The fertilized females were fed with honey and water on the one hand, and with human blood or that of the guinea pig on the other. It is shown that one or more meals of blood are essential to the development of the eggs. Lack of space forbids giving even a synopsis of these experiments. It is only possible to give the author's final conclusions, which apply more particularly to *Stegomyia fasciata*, and state that in general they are borne out by the experiments. In brief his conclusions are as follows:

1. Honey prolongs the life of the mosquito in captivity and is taken with avidity, not only by the female, but above all by the male.

2. Blood of vertebrates is eagerly and persistently sought by the female; obtained by sucking it shortens life as further explained. Blood drawn in other ways, although fresh, is refused or accepted with indifference not only by the males but also by the females.

3. Sucked blood is a food which favors and accelerates the laying of eggs and produces a certain, energetic and immediate reaction in the organization of the female, perceptible from the first ration.

4. Honey, on the contrary, has a retarding, interrupting, or at least neutral effect upon oviposition. The same is true of other sweet liquids and vegetable food.

5. With certain mosquitoes, in captivity, we have the power to prolong life and suppress oviposition, or bring about prompt oviposition by withholding or supplying blood as food.

6. It is a fact that in previously fertilized females of *Stegomyia fasciata* the faculty of laying fertile eggs can be preserved latent during periods of from 23 to 102 days and called to life at pleasure by changing the diet to one of blood.

7. In other words: A diet of honey is of advantage to the individual by prolonging life, but of disadvantage to the species, for it retards reproduction. A blood diet, on the contrary, is prejudicial to the individual, for it shortens life, and most advantageous to the species, as it favors reproduction.

8. We have the right to call blood an indispensable factor in the production of fertile eggs. By the above experiments, what has so far been only a hypothetical supposition, has now been definitely proven.

9. Unfertilized females, bred in captivity and in strict isolation, readily accept blood. Copulation is not a necessary preliminary to enable the female to practice hæmatophagy.

10. These unfertilized females of *Stegomyia* may lay eggs, though these are not fertile and do not produce larvæ.

11. Oviposition completed, the female, both of *Stegomyia* and of *Culex fatigans*, dies in the following days, in most cases immediately afterward. The female survives in cases where oviposition is incomplete until the fractional deposits have made up the total.

12. In order to make a complete deposit of eggs it is necessary that the female of *Stegomyia* should have several successive rations of blood, at least two or three. With *Culex fatigans* the results on this point have not been equally decisive.

13. The respective interval between the meal of blood and oviposition, taking the average, for *Stegomyia fasciata* is 3.7 days = 88.8 hours, and for *Culex fatigans* 3.5 days = 84 hours.

14. The interval from the time the eggs are laid to the appearance of the larvæ, taking the mean, is, for *Stegomyia fasciata*, 4.5 days = 108 hours, and for *Culex fatigans* 1.8 days = 43.2 hours.

The second chapter closes with an extensive account and discussion of the habits of *Stegomyia fasciata*, which clearly demonstrates that this

species has become completely domesticated. While certain species of mosquitoes probably persecute by preference particular animals, among all the mosquitoes there is none that has so exclusively adapted itself to the persecution of man in the tropics as *Stegomyia fasciata*. Along the Atlantic littoral of South America it fastens upon the heels of man wherever he settles in numbers and the houses are concentrated into cities of any size. Steam navigation has been the means of spreading the species, and only by taking into account this fact can its present geographical distribution be understood in its details. A valuable illustration is furnished by the manner in which *Stegomyia* is little by little conquering the Amazon valley. It has departed, by exception, from the littoral route, and entering in a perpendicular direction to the coast line, has reached the remote interior. It has established itself at Manáos, capital of the state of Amazonas, a rapidly growing city of modern aspect 1,600 kilometers from Pará. However, according to reliable information obtained by the author, the species has not made itself felt in Santarém, Faro, Monte Allegre and Obidos, all cities at a much lesser distance from Pará. The author thinks that while there may be other secondary factors, the principal reason for this negative condition is the small size of these towns. The author believes that an inquiry into the data when yellow fever first appeared at Manáos, and the beginning of steam navigation with Manáos as a terminus, would show an intimate and significant relation between these two facts. The great waterway, with its direction nearly parallel to the equator, navigable for large ocean vessels to its upper reaches and with its climatic conditions most favorable to this eminently tropical mosquito, will prove an excellent highway in the conquering march of *Stegomyia*. Even while the sheets were in press, the newspapers of Pará brought telegraphic notice that the "black vomit" had made its appearance in Iquitos (Peru) on the upper Amazon. In Pará, in certain parts of the city, *Stegomyia* abounds to the point of making existence unbearable, particularly for those whose professional duties keep them at the work-table. The hot hours of the day are those in which it shows itself most blood thirsty and insistent. When one perspires slightly it persecutes by its bite with a tenacity and cruelty of which it would be hard to find another example. That the growing insolence of its persecutions goes parallel with the increasing perspiration of our body is something which must impress every attentive observer. It is evident that the perspiration of

our body plays a significant rôle in the life of this mosquito. During the hot hours of the day the head and hands of persons resting clothed, in hammock or bed, are besieged by a cloud of perhaps ten or fifteen *Stegomyias*, mostly males, in incessant serpentine evolutions. Even the males are aggressive during these hours and persecute any uncovered part of the body to suck sweat. If they do not succeed in biting it is not from lack of desire, but owing to the weak mouth-parts. Although it has been frequently asserted that the male *Stegomyia* bites and sucks blood, neither the author nor any of his colleagues have ever detected one in the act or found one dilated with blood. However, they do alight upon the person, and the author thinks they produce an irritation that only differs in degree from that of the female's bite. While the male does not succeed in perforating the epidermis it certainly irritates it, and a close study of the male mouth-parts would probably show an unusual development for that sex. The disagreeable sensation produced by the males is augmented by their truculent hum, uttered in a thin concert voice.

The habits of *Stegomyia* are now discussed in their bearing on the theory of the origin of the blood-sucking habit propounded on a previous page. Clearly sweat belongs to the same order of products as the others sought by Diptera, the blood serum and the moisture on the edge of the eyes. When *Stegomyia* first associated itself with man both sexes fed upon his perspiration. From this stage the females progressed to the habitual perforation of the epidermis and became professional suckers of human blood. The males continue in the historically more ancient stage of lappers of sweat and similar secretions of the human body.

When *Stegomyia* is abundant one observes that the males show a certain aloofness and tendency to congregate apart from the females in little clouds of 15 to 20 or more. This manifests itself, for example, when the males congregate over the edge of a table or cabinet while the females are circulating about the room, or they collect about the upper part of a mosquito-bar while the females are reconnoitring beneath the bed. These elevated positions are points of vantage from which the males pounce upon any female that they detect crossing the area of their dominion.

*Stegomyia* is a singularly light-loving mosquito. This is shown by the merry hum of the males as well as the females, dancing in animated swarms, when the moderate sunlight of late afternoon shines



into their cages. The sounds produced under these conditions were determined with the assistance of two musically educated colleagues and by the use of a cither and diapason with determined vibrations. The note of the female corresponded to C in the treble clef and that of the male to the A above. The male note has 880 vibrations, that of the female 480, and the two sounds hold the relation of a sextad to each other. In both cases the impression was obtained that along with the principal note the respective octaves were heard, so that the timbre was obscured by the concomitant notes. A certain effect upon the height of pitch is exercised by the greater or less dilation of the abdomen with food and perhaps also in certain psychic states and under the influence of mutual suggestion. According to Nuttall and Shipley the note of *Anopheles maculipennis* in the male coincides with that of *Stegomyia* while in the fed female it is in the neighborhood of low C with 240 vibrations, an octave lower than in *Stegomyia*.

Little appears to have been made known about the copulation of *Stegomyia*. The author states that he has seen it millions of times and sees it every day, but, as yet, has not been able to describe it satisfactorily in its minor details. In general outline the process is as follows: a male, from his outlook, precipitates himself upon a female that comes flying near and attaching himself to the under side allows himself to be carried in gentle flight for a few seconds (not more than two or three) and again departs. It is the work of a moment and it is really surprising with what rapidity the act is accomplished. The flight is so short that it is executed without difficulty within a cage, a fact which makes it possible to breed successive generations of the species in captivity. As well as one can judge, without previously marked individuals, the same male copulates several times in rapid succession with diverse females that approach. The process differs from the bacchanals of *Culex fatigans*, described on a previous page, in that there are not two distinct swarms, one of males, the other of females. Still there is a tendency to keep separate, a kind of antagonism already alluded to. The nuptial flight of *Culex fatigans* is likewise only of a moment but it seems to require more space and therefore is not realized in captivity with the facility, one might almost say mathematical precision, of *Stegomyia*.

The writer thinks that *Culex fatigans* is more obstinate, timid and rebellious in behavior and more refractory to domestication. He believes that a proof of this is the singular circumstance that of all

the trials made with females in captivity, both captured and bred ones, only one sucked blood. *Culex fatigans* shows itself much inferior to *Stegomyia* in intelligence and this agrees well with the idea that, like other hæmatophagous insects, this mosquito is principally found in relation with a definite vertebrate host. The author believes that primitively *Culex fatigans* was less partial to the human species than to certain domestic animals and his suspicion points mostly to its being an inquiline of poultry-houses. Is it not possible that in this evident intellectual diversity of these two species of mosquito the diversity of their respective primitive hosts is reflected? Surely no one will dispute that it requires a more expert mosquito to persecute man than poultry, cats or dogs.

Discussing the original home of *Stegomyia fasciata*, the author expresses his belief that it is of African origin. He bases this idea largely upon a study of the geographical distribution of the genus *Stegomyia* by means of the data gathered from Theobald's Monograph. Of the 21 known species of the genus, eleven, or more than half, are African, while only four are American. The author fails, however, to take into account the fact that our knowledge of the mosquito fauna of tropical America is extremely fragmentary. At least three additional species of *Stegomyia* are now known from the West Indian region, which, with the neighboring coasts, most likely represents the home of the American *Stegomyias*.\* *Stegomyia fasciata* is now so widely dispersed that a study of the species itself will hardly furnish a clue to its original habitat. The author believes that *Stegomyia fasciata*, along with other afflictions such as filariasis and the sand flea (*Sarcopsylla penetrans* L.), has followed in the wake of the slave trade probably in quite early times. Of course it is quite as likely that the reverse is true and that the species has been disseminated from America. The whole question is inseparably bound up with that of the origin of yellow fever and perhaps the history of this disease will furnish proper data to settle the question. The author touches upon this part of the subject in Chapter III, where he resumes the discussion of the probable

\* Since the above was written these three species referred to have been described by Mr. D. W. Coquillett. Two of them, together with *Stegomyia sexlineata* Theob., are placed by Mr. Coquillett in a new genus *Gymnometopa* (Proc. Ent. Soc. Wash., VII, 183). It should be noted that it is highly doubtful that the genus *Stegomyia* represents a distinct and homogeneous group. Most of the recently made Culicid genera are based upon very unsatisfactory characters and do not represent natural groups, as is clearly apparent from a study of the larvæ.

origin of *Stegomyia fasciata*. He concedes that the malady which carried off part of the crew of Columbus was most likely the yellow fever, but protests that this does not constitute a proof against its previous existence in Africa. A further argument is sought in the close association of *Stegomyia fasciata* with man and its partiality to large cities. He asks where were the large cities on the Atlantic coast between the Antilles and the Rio Plata? He further states that the indigenous American was at all times what he still is to-day; jealous of his absolute freedom, he has neither the habits nor the inclination necessary to concentrate himself in cities of really large size. The characterization of the native American which follows is a very faithful portrait of the Amazonian Indian and will apply, in the essential points, to our North American Indians as well. He contrasts with the retiring characteristics of our Indians the excessive sociability of the African. All the accounts of African travelers abound with exclamations of surprise at the number of towns reaching a size beyond easy estimation. The author has, however, entirely ignored Mexico and Central America, peopled in great part by natives of advanced culture and entirely different character from the primitive races to the north and south. Surely the writer is not wholly ignorant of the historical accounts of the dense population of peaceful agriculturalists that inhabited the region at the time of its discovery and the extensive cities, doubtless of great age, that existed then. We know that even upon the author's own ground, the lower Amazons, at the time of the discovery there was a dense agricultural population congregated in large towns—a population probably far in excess of that of the present day.

The author likewise assumes an Ethiopian origin for *Culex fatigans* and points out the close correspondence in the distribution of this species and *Stegomyia fasciata*, as shown in the maps given by Theobald, and this he believes to be by no means accidental. It is fitting here to call attention to the uncertain status of some of the species of *Culex*, particularly those of the group to which *C. fatigans* belongs, and the absolute impossibility, in some cases, to refer specimens to their proper species with certainty. The author himself, on another page, points out that the variety *skusii* of *Culex fatigans* must be a distinct species, as the larval characters differ widely in the two forms. From a study of the larval material brought together by Dr. L. O. Howard for his forthcoming monograph of the Culicidæ the reviewer has

reached the conclusion that the American form known as *Culex fatigans* represents a distinct species peculiar to the tropical and subtropical regions of this hemisphere.

The author believes that *Stegomyia fasciata* and *Culex fatigans* are inseparable allies, always to be found together, the nocturnal *Culex fatigans* supplementing the diurnal *Stegomyia fasciata* in the persecution of man and the two constituting a strong combination against him. He believes that future studies will show that the influence of these two mosquitoes, over and above the grave diseases which they transmit, is the principal cause of tropical anemia.

Attention is called to the occurrence of dwarf specimens, both of *Stegomyia fasciata* and of *Culex fatigans*, a circumstance of considerable importance as they succeed in passing through screens effectual against normal mosquitoes. At certain seasons these dwarfs are more numerous and even become the predominating form. Thus it appeared that in the last weeks of October and in November, just before the opening of the rainy season, these small females were particularly numerous. These dwarf mosquitoes are the product of adverse conditions during development, such as the reduction of water and food in the dry season, so that there may be said to be a small æstival generation. It is a wrong opinion that the individuals of this dwarf race are less aggressive and blood-thirsty than those of normal size; they behave in every way the same and their bite is equally painful.

One cannot suppose that on the whole Brazilian coast, southward to Rio Janeiro or Santos, there is a single place where the development of *Stegomyia* ever comes to a standstill. There are larvæ throughout the year, although there will be fluctuations in the rate of development corresponding to hot or cold, wet or dry season in the different localities. Inquiries into these conditions gain particular importance through their relation to the periodicity of yellow fever.

From the experiments it appears that *Stegomyia fasciata* shows a decided preference for human blood over that of the guinea pig, and human blood seems to have a more favorable effect upon oviposition. Reptilian blood, that of a lizard (*Tropidurus torquatus*) was offered but not accepted.

As all other mosquitoes are extremely sensitive to currents of air it is remarkable that *Stegomyia* is quite indifferent to even a strong wind. The author found that a strong wind blowing into a window, or the current of air from an electric fan, did not in the least interfere with

the evolutions and biting of the *Stegomyias*. It appears likewise to be quite indifferent to strong odors as in one case that from a floor saturated with creoline did not affect them. Strong mediums are necessary, such as fumes of sulphur, chlorine or strong fumigation with pyrethrum.

The question whether *Stegomyia fasciata* bites at night is of importance in view of the often mentioned "diários de Petropolis," that is, the security from yellow fever enjoyed by those who spend the day in the city of Rio de Janeiro but return to their homes in the nearby mountains before nightfall. The author professes that he approached this question with great scepticism. However now he is in possession of quite a number of perfectly verified cases in each of which the mosquito was taken "en flagrante" and identified by him. These cases occurred both at Rio de Janeiro and at Pará. Nearly all the cases observed at Pará occurred in nearly the same manner, between the hours of eight and eleven at night while the author was writing by an electric light, the window open. The mosquitoes that alighted upon the hands and sucked blood were generally *Teniorhynchus fasciolatus* or *Panoplitus titillans* but now and then a female *Stegomyia* presented itself. The bites personally observed at Rio de Janeiro occurred during the same hours in a room of the library. The author always noticed that during the day he was more persecuted by *Stegomyia* in that room than elsewhere and he quickly discovered that the mouldings and the upper and under sides of the shelves were the chosen hiding places of these mosquitoes. These cases, however, are not the rule but exceptional; perhaps one in a hundred bites at night and then only with light, not in complete darkness. The weak light of the night-lamp in a sleeping room is perhaps sufficient. These observations do not weaken the statement that *Stegomyia fasciata* is essentially a diurnal mosquito. Now and then some female overpowered by hunger prolongs its hunt into the night, above all when stimulated and guided by the light in a room. That *Stegomyia* will readily accept blood at night in captivity the writer considers an anomaly due to the unnatural laboratory conditions. There is a popular saying that to get rid of mosquitoes it is only necessary to put out the light. This advice, if it does not simply allude to the fact that the healthy organism, tired from the day's occupation, falls asleep more readily in a dark room, must refer to *Stegomyia fasciata*. In the case of *Culex fatigans* and *Anopheles* the promised result will certainly not be realized.

But there is still the possibility that perhaps the female *Stegomyias*



seeking blood at night are themselves the victims of an anomaly and acting under a morbid impulse, perhaps produced by a parasite. Perhaps there is here some relation with the agent of yellow fever!

The third chapter, "biological details," contains a great deal of interest, and it is to be regretted that the details, particularly of larval structure, are not more full. The plates that accompany this chapter are of great interest, particularly the figures from photographs of eggs, larvæ and pupæ, more or less magnified. The figures from drawings, we are sorry to say, are not equally commendable, and, at least in some cases, appear superficial and inaccurate. Some of these inaccuracies will be pointed out in connection with the following notes. Sixteen species of Culicidæ, three Chironomidæ and a *Simulium* are dealt with, but of some of the species the early stages remain unknown and only notes upon the imago are given.

*Culex fatigans* and *Stegomyia fasciata* are treated most fully, and each of these species is illustrated by two double-page plates. One of these plates is entirely given up to the eggs of *Culex fatigans*, and the figures, from photographs, of the eggs singly and in rafts, are very excellent. As the author remarks, these eggs do not appear to differ in any way from those of *Culex pipiens*. Regarding the small globule at the pointed end of the egg, the writer at first followed the supposition of previous writers that it is air. Closer study of its optical qualities and behavior in various liquids used in microscopic technique showed that it is of a gelatinous or mucilaginous substance. The globule is detached by the slightest pressure and in the water swells and then disappears altogether. At the same time the author became convinced that the entire base of the fresh egg-raft is covered by a layer of gelatine, similar to the substance present in so many other insect eggs, and even those of vertebrates. He attributes a hydrostatic function to the globule. Both the globule and the lower layer disappear before the breaking up of the egg-boat, which begins soon after the larvæ have hatched. The author thinks that this gelatinous substance may perhaps furnish the first food to the young larvæ. The cup-shaped appendix on the rounded end of the egg has been figured by several authors, but without comment. The author thinks it is connected with the intra-ovarial period, the remnant of the germinative chamber and entirely without physiological significance after the egg is laid. The figure of the sculpture pattern of the interior of the cup shows series of points arranged around a central round depression.

The female of *Culex fatigans*, in ovipositing, shows great predilection for water containing animal matter. A vessel in which the skulls of several small mammals were being macerated after two or three days contained a great number of egg-boats—at least 100 or 200—and further tests gave the same result. This fact could be utilized and the mosquitoes induced to lay their eggs in trap-jars, where the eggs could then be destroyed. Unfortunately the details of the larval characters given in the text and figures are insufficient and will not serve to separate this species from *Culex pipiens*. The author himself calls attention to the close resemblance between the two larvæ, but wisely remarks that it would be premature to pronounce upon the relative value of these two forms. He urges that describers should be exact and adopt a standard for description, else a labyrinth of error and confusion must result.

*Culex confirmatus* is noticed in Pará mostly in the dry season and frequents dry fields and gardens when water is present in ditches or natural depressions. It was noticeably abundant in a garden near Rio de Janeiro, and showed itself impertinent and besieged one in clouds of ten or twelve. It is diurnal and loves the light, and people are mostly troubled by it during the hottest hours with burning sun. The author questions that Grabham could have had the same species under observation when he states that "this species appears to be active only during the night." As a matter of fact, neither the larva characterized by Grabham (Can. Ent., v. 37, p. 404-405) nor by Dyar (Journ. N. Y. Ent. Soc., v. 13, p. 23-25) in the least resemble that figured by the present writer. The larva figured cannot be of this species, but is a *Culex* in the restricted sense, and the author correctly points out its relationship to our *Culex territans*. The large and stout antennæ bear a tuft at the set-off three-fourths from the base, and the breathing tube is extremely long and slender. The author twice succeeded in obtaining eggs from captive females fed with guinea-pig blood. The eggs are lanceolate-oval and are laid singly.

In the larva of the *Culex* sp. *indet.* from the forest of Murutucú close to Pará, attention is called to the pointed form of the anal gills, resembling those of the *Psorophora*. The figure of the labial plate is very characteristic, the pecten teeth of breathing tube bear a fringe of spines and the scales of the comb are large and simple. Doubt is, however, thrown on these characters by the two figures of antennæ, of entirely different types, for this same species and leads one to infer that the author has confused two species.

Of especial interest are the author's observations on the early stages of two species of the genus *Teniorhynchus*, *T. fasciolatus* and *T. arribalzaga*. The first information relating to the early stages of this genus was given by Dr. Goeldi in a footnote on p. 27 of his first bulletin on the mosquitoes of Pará, published in 1902, and notes furnished by him were incorporated in Theobald's Monograph, v. 3, 1903, p. 257 and 269. These observations are based upon *T. fasciolatus* but answer as well for the other species, as no essential differences were noted between the two. It is decidedly a forest mosquito, and only enters houses occasionally in the evening. It shows itself sensitive to confinement and does not survive it long. Of 170 captured females fed with blood only 25 laid eggs. The eggs are laid in a double-rowed chain, fastened together like those of *Culex pipiens*. The chain is rather strongly convex upon the lower side, and rests upon the water after the manner of the egg-raft of *Culex pipiens*. It is only after the larvæ have been hatched that it falls upon its side and disintegrates. The number of eggs in a chain was from 60 to 63 and the female dies very soon after the act of oviposition. The eggs hatch in about four and one-half days. The author compares the shape of the eggs to that of a champagne bottle but the accompanying figures do not show the pronounced neck that this description implies. The surface of the egg is covered with coarse conical papillæ. The young larvæ are of very remarkable appearance well shown in two photographic figures. The antennæ are very large and of peculiar shape but are not two-jointed as the author indicates in the drawing of fig. 76. The mouth tufts are large, the tracheal tubes very slender. Most remarkable is the form of the breathing tube, the basal portion very broad and rounded off, narrowed beyond the middle to a very slender tube terminated by a whorl of spines. The slender terminal portion somewhat exceeds in length the broad basal part and the general aspect reminds one of a peaked helmet. All attempts to rear these larvæ failed and they died after a few days. These larvæ agree quite closely in general appearance with the young larvæ of *Teniorhynchus perturbans*, described and figured by Dyar and Currie in Proc. Ent. Soc. of Washington, v. 6, 1904, p. 218-220. In this last-mentioned species, however, the eggs, about 150, are laid in a raft. No clue has yet been given to the natural habitat or food of these strange larvæ and it is to be hoped that Dr. Goeldi, in such favorable surroundings, will succeed in solving the mystery of these strange larvæ.

The eggs obtained by the author from another species, *Tæniorhynchus fulvus*, leads him to express doubt that it should be retained in the same genus. He calls attention to the great dissimilarity of the imago to those of the two first-mentioned species and proposes the generic name *Chrysoconops* for this species. The eggs are short, very broad at the middle, tapering to a blunt point at each end, almost rhombic in shape. They are laid detached, in a double row which soon becomes disarranged.\*

Very good figures are given of *Mansonia titillans* in the act of oviposition and of its eggs. The eggs are laid detached, in a double mass. They are broadest at middle, tapering at both ends, but much more slender than those of *Tæniorhynchus fulvus*.

A plate is devoted to the eggs of *Janthinosoma musica* and *J. lutzii* which are likewise laid singly. The surface sculpture consists of recumbent spines.

*Trichoprosopon nivipes* demands especial attention as it is the representative of Theobald's subfamily Trichoprosopina of which the larvæ were heretofore unknown. The author obtained larvæ from the water between the leaves of Bromelias, at the base of banana leaves and like situations. The appearance of the pale larvæ is well shown in a photographic picture and their general resemblance to the Sabethinæ quite apparent. The figure of the mandibles hardly conveys the correct impression as only the slender strongly dentate portion is shown. The mandibles remind one strongly of the Chironomidæ, particularly when seen endwise and the great thickness of the base is apparent. There is reason to believe that in his notes on the young larva of *Trichoprosopon*, accompanied by a figure of the breathing tube, the author had before him the larva of *Limatus durhami* which is often found associated with *Trichoprosopon*. The pupa of *Trichoprosopon* has very small terminal paddles and the last and penultimate segments bear ample tufts of 24-26 and 14-16 hairs respectively, while the other segments bear only single hairs.

*Limatus durhami*, in the imago as in the larva agrees with *Trichoprosopon* in habits. Imagos in confinement refused to suck blood and laid no eggs. When fed honey they only lived from 2-8 days. The larva is characterized by a very elongated abdomen and a small, almost rectangular head. The antennæ are very small. The breathing tube

\* Mr. D. W. Coquillett has recognized in *Tæniorhynchus fulvus* a species of *Psorophora*, so that *Chrysoconops* Goeldi becomes a synonym of *Psorophora*.

is short and bears, both above and below, a series of hairs in pairs and singly. The comb consists of half a dozen scales in a row. The pupa is more elongate than that of *Trichoprosopon* and has, like it, tufts upon the last two segments. The paddles are very poorly developed.

The showy *Megarhinus separatus* is a common species in the Amazon region. Mr. A. Ducke, entomological preparator of the museum, has experienced its bite and compares it in painfulness to the sting of a wasp. He also obtained the eggs, larvæ and pupæ. The eggs are elongate, almost cylindrical, and float upon the water in groups of four to six lying side by side. One end of the egg is smooth, while more than half of it is granular and covered with very prominent tubercles. These tubercles are more or less constricted at the base and appear to have an opening at the tip. They serve to keep the egg afloat by the air retained between them. When the larvæ are hatched the egg splits open lengthwise at the smooth end, a mode very distinct from that observed in other mosquito eggs. The larva greatly resembles that of our North American *Megarhinus portoricensis*. Distinguishing characters are furnished in the labial plate, mandibles and antennæ. The predaceous character of the larvæ appears to have escaped the author.

*Anopheles albipes* is a rather rare mosquito at Pará and only appears occasionally in the outskirts at dark. The author did not succeed in finding the larvæ in their natural habitat. Eggs were obtained in the usual manner from a female fed successive rations of blood. Figures are given of the eggs greatly enlarged and also one to show their stellate grouping as laid upon the water. The young larva has two very long terminal hairs. This mosquito is distinguished by the common people from the ordinary mosquito or "*carapanã*" by the popular name "*moroçôca*."

The chapter closes with descriptions of two new species of *Chironomus*, — *C. calligraphus* and *C. holoprasinus*, — of a little biting fly "*miruim*," a species of *Ceratopogon*, under the name *Hæmatomyidium paraense*, and of the famous "*piim*" of the upper Amazons as *Simulium amazonicum*. The eggs and larva of *Chironomus calligraphus* are figured, as also the imago of the *Ceratopogon* and its wing greatly enlarged.



## Class I, HEXAPODA.

### Order V, LEPIDOPTERA.

## THE NORTH AMERICAN NYMPHULINÆ AND SCOPARIINÆ.

By HARRISON G. DYAR, A.M., PH.D.,

WASHINGTON, D. C.

I have prepared the following account of the Nymphulinæ (Hydrocampinæ) and Scopariinæ at the instance of Professor C. H. Fernald, who has loaned me his material in these groups. Professor Fernald has undertaken a general account of the North American Pyralidæ (except the Crambinæ and Phycitinæ), but asked me to relieve him of the work on the present groups.

### Family PYRALIDÆ.

#### Subfamily NYMPHULINÆ.

Moths usually of very slender build, the legs very long. Proboscis present. Fore wing with vein 7 from the cell, 10 usually stalked with 8 and 9, if not, the maxillary palpi are long and dilated at the extremity. Hind wing with the median nervure not pectinate.

The group is close to the Pyraustinæ, and not strongly distinguished therefrom. I am inclined to agree with Mr. Meyrick that the group should be united with the Pyraustinæ. I follow Sir George Hampson in holding them separate for convenience sake, though in the next catalogue I expect to see them united as they were in Smith's 1891 list, where Professor Fernald followed Mr. Meyrick's very sound views.

To this group belong those peculiar larvæ which are fitted for a wholly aquatic life; but not all the larvæ of the group are so modified, so that the group is defined on no larval character.

#### TABLE OF GENERA.

Palpi upturned.

Palpi with the third joint long and acuminate.

Maxillary palpi filiform, moderate.

- Hind wings with the outer margin excised before anal angle....**Ambia**.  
 Hind wings with the outer margin even.  
     Outer margin straight .....**Elophila**.  
     Outer margin convex.....**Geshna**.  
 Maxillary palpi long; dilated with scales at extremity.  
     Hind wings with the outer margin evenly rounded.....**Nymphula**.  
     Hind wings with the outer margin excavated below apex..**Oligostigma**.  
 Palpi with the third joint short and blunt.....**Pileocera**.  
 Palpi porrect.  
     Hind wings with vein 4 absent .....**Diathrausta**.  
     Hind wings with vein 4 present.....**Steniodes**.

#### Genus NYMPHULA Schrank.

- Nymphula* Schrank, Fauna Boica, ii, 162, 1802.  
*Hydrocampa* Latreille, Fam. Nat., 478, 1825.  
*Paraponyx* Hübner, Verz. bek. Schmett., 362, 1827.  
*Synclita* Lederer, Wien. ent. Mon., 1863, 448.  
*Nymphælla* Grote, No. Am., Ent., i, 97, 1880.  
*Hygraula* Meyrick, Trans. N. Zeal. Inst., xvii, 129, 1885.  
*Hydewetis* Meyrick, Trans. ent. soc. Lond., 1895, 435.

Palpi upturned, the second joint moderately fringed with hair in front and reaching vertex of head, the third well developed and acuminate; maxillary palpi long and dilated with scales at extremity; frons rounded; antennæ usually annulated; ocelli usually prominent; legs long, the tibiæ usually smooth with the spurs almost equal. Fore wings with veins 3, 4, 5 from angle of cell; 7 straight and well separated from 8, 9, 10; 10 usually stalked. Hind wing with the cell about half the length of the wing; veins 3, 4, 5 from angle; 6, 7 from upper angle; 7 strongly anastomosing with 8 (Hampson).

#### *Synopsis of Species.*

- Hind wings white, the median lines obsolete.  
 Sexes usually dimorphic, the male with spots on forewing, the female uniformly dark gray .....**maculalis**.  
 Hind wings with dark lines, usually distinct, at least traceable, or all dark.  
     Hind wings with the central fasciæ even and parallel.  
         Hind wings with the central fasciæ approximate, wavy .....**allionialis**.  
         Hind wings with the central fasciæ remote, straight.  
             Fore wings shaded with brown; outer median band of hind wing broad.....**obscuralis**.  
             Fore wing white; mesial bands of hind wing alike.....**badiusalis**.  
     Hind wings with central fasciæ irregular, divergent centrally or lost.  
         Lines of hind wing indistinct, clouded.  
             Wings obscured by dark gray.  
                 Discal spot white, contrasted.....**obliteralis**.  
                 Discal spot metallic gray, obscure.....**nomophilalis**.  
             Hind wing white, the lines faint.....**gyralis**.  
         Lines of hind wing well marked.

Fulvous discal spot of hind wings without black edge.

Smaller, darker fulvous shaded, the marks contracted, the white areas reduced .....**nebulosalis.**

Larger, paler fulvous shaded, the marks expanded, the white areas developed .....**icciusalis.**

Fulvous discal spot of hind wing with a black edge.....**ekthlipsis.**

### ***Nymphula maculalis* Clemens.**

*Sironia maculalis* Clemens, Proc. Acad. Nat. Sci., Phil., xii, 218, 1860 (♂).

*Nephopteryx seminiella* Walker, Cat. Brit. Mus., xxxv, 1717, 1866 (♀).

*Nymphocella dispar* Grote, No. Am. Ent., i, 97, 1880.

*Parponyx maculalis* Grote, New Ch. List N. Am. moths, 54, 1882.

*Nymphula maculalis* Fernald, Smith List Lep. Bor. Am., no. 4185, 1891.

*Nymphocella maculalis* Hart, Bull. Ill. Sta. Lab. Nat. Hist., iv, 167, 1895.

*Nymphula seminiella* Hampson, Trans. Ent. Soc. Lond., 142, 1897.

*Nymphula maculalis* Fernald, Bull. 52, U. S. Nat. Mus., no. 4495, 1903.

*Male.* Wings elongate, inner margin nearly as long as costa, outer margin short, convex, little oblique. Hind wings ample, the outer margin convex. White, head thorax and abdominal segments more or less overspread with dark gray; the collar usually whitish; legs white. Fore wing white, marked with dark gray along all the margins, at end of cell and over discal nervules, along median vein and in a spot across submedian space, dividing the white ground into four subquadrate patches; a submarginal light shade; a faint ochereous spot at base of veins 3-4. This dark marking is variable in extent, and the white marks may be confluent. The patches at end of cell and on submedian space tend to remain darker than the other marks. Hind wing white with a trace only of two dark bands, being a faint discal bar and mark at anal angle. Below white without markings. Expanse 20 mm.

*Female.* Fore wings dark slaty gray, uniform, unmarked. Hind wing as in the male, with a little more gray along outer margin and the discal mark obsolete. Expanse 25 mm.

Lake Teedyuscong, Pike Co., Pa. (Clemens); Lewis Co., N. Y. (Grote); Sand L., Fourth L., Cedar L., Fox L., Urbana, Ill., June 19, 22, July 8, 22, August 4, 11 (Hart).

1 ♂, 1 ♀, Mass. (C. H. Fernald); 2 ♂, 3 ♀, on leaves of *Nelumbo*, Pine River, Lake Superior, August 18, 1896, no. 7234 (H. G. Hubbard); 2 ♂, 4 ♀ on water-lily leaves, Big Tupper Lake, N. Y., August 26, 1905 (H. G. Dyar); 1 ♂, 1 ♀, New York, nos. 9630, 15814 (Asa Fitch collection); 1 ♂, 2 ♀, Coconut Grove, Fla. (E. A. Schwarz).

*Ab. a.* ♂. Fore wings heavily black marked, the white spots reduced in size; discal band of hind wings developed across wing as a nearly straight brown-black line.

1 ♂, Hamilton, Ontario (Jas. Johnson), no. 325, in coll. Prof. C. H. Fernald.

*Ab. b., fæminalis*, new variety. ♂. Fore wing dark slaty gray as in the normal female with a black discal mark and one on submedian interspace. Hind wing immaculate white.

3 ♂, Palm Beach, Fla., January 25, 1900 (H. G. Dyar).

Type no. 9494, U. S. Nat. Mus.

*Ab. c., masculinalis*, new variety. ♀. Entirely white, the fore wing with only slight gray shading on costa, outer margin, discal and submedian spots as in the normal male.

2 ♀, Cocanut Grove, Fla. (E. A. Schwarz).

Type no. 9495, U. S. Nat. Mus.

The larva appears to be unknown: It is probably aquatic, as the adults are taken resting on leaves of water plants and flying from one to another when disturbed, at considerable distances from shore.

#### ***Nymphula allionealis* Walker.**

*Paraponyx allionealis* Walker, Cat. Brit. Mus., xii, 458, 1859.

*Hydrocampa itealis* Walker Cat. Brit. Mus., xvii, 458, 1859.

*Paraponyx crotacealis* Lederer, Wien. ent. Mon., vii, 484, 1863.

*Paraponyx plenilinealis* Grote, Pap., i, 17, 1881.

*Paraponyx crotacealis* Grote, New ch. list No. Am. moths, 54, 1882.

*Paraponyx plenilinealis* Grote, New ch. list No. Am. moths, 54, 1882.

*Hydrocampa allionealis* Fernald, Smith List Lep. Bor. Am. no. 4171, 1891.

*Paraponyx allionealis* Hart, Bull. Ill. Sta. lab. Nat. Hist., iv, 173, 1895.

*Nymphula allionealis* Hampson, Trans. Ent. Soc. Lond., 142, 1897.

*Nymphula itealis* Hampson, Trans. Ent. Soc. Lond., 142, 1897.

*Nymphula plenilinealis* Hampson, Trans. Ent. Soc. Lond., 142, 1897.

*Nymphula allionealis* Fernald, Bull. 52, U. S. Nat. Mus., no. 4491, 1903.

♂. Inner margin long, outer margin convex, not oblique. Wings white to fuscous brown, rarely pure white, more often variously tinted with yellowish brown, rarely darkly colored; lines narrow, fuscous; fringe dark spotted; a narrow terminal line; a broader slightly waved band within; an irregular oblique outer line, bent in below discal dot and pointed out on submedian fold; an obscure inner line. Hind wing with a faint inner line, discal dot, two parallel lines beyond it, a waved submarginal line and dots on fringe. Below the marks repeated more faintly. Expanse, 14 to 17 mm.

♀. Wings more pointed, outer margin straight. Marks as in the male; ground color generally white, overspread with brown as in the male but more variable than that sex. Some specimens are entirely white, the marks all obliterated although in part traceable, very faintly brown. Others are all obscured by brownish gray, the markings obliterate, even less traceable than in the white form.

Georgia (Walker); Wisconsin, September (Grote); Urbana, Ill., May 29, June 7, 29, July 6, 7, 23, 27 (Hart).

1 ♂, no. 279 coll. Prof. C. H. Fernald, compd. with type of *cretacealis*; 6 ♀, Holyoke, Mass., July 14, 27, 28, 1898 (C. H. Fernald); Florida (coll. C. H. Fernald); 2 ♀, Cayugo Co., Ohio, Chicago, Ill. (coll. W. D. Kearfott); 1 ♀, Chicago, Ill. (A. Kwiatt); 14 ♂, 23 ♀, Palm Beach, Coconut Grove and Miami, Fla., March, August (Barnes, Schwarz, Dyar and Caudell).

The larva appears to be undescribed. Hart remarks that it is probably related to that of the European *strattonata*, which differs from that of *Nymphula obscuralis* Grote in the lesser development of the respiratory filaments.

### **Nymphula obscuralis Grote.**

*Oligostigma obscuralis* Grote, Pap., i, 18, 1881.

*Oligostigma obscuralis* Grote, New ch. list No. Am. Moths, 54, 1882.

*Hydrocampa obscuralis* Fernald, Smith list Lep. Bor. Am., no. 4169, 1891.

*Paraponyx obscuralis* Hart, Bull. Ill. Sta. Lab. Nat. Hist., iv, 167, pl. I, ff. 1-7, 1895.

*Nymphula obscuralis* Hampson, Trans. ent. soc. Lond., 142, 1897.

*Nymphula obscuralis* Fernald, Bull. 52, U. S. Nat. Mus., no. 4493, 1903.

♂. White, the fore wings shaded with blackish brown; outer line white, wavy, bent inward at median vein and obsolete, followed by a broad, dark shade; a dark half-band at middle of inner margin; base dark; terminal line black, incised subapically; fringe dark. Hind wing with slender mesial line, broad, dark outer mesial band; a broad marginal orange band with a slender dark line within and row of geminate spots without in the base of the white fringe. Expanse 17 mm.

♀. Similar. Expanse 21 to 29 mm.

N. Y., Wis., September (Grote); Urbana, Ill. (Hart).

1 ♂, Algonquin, Ill., August 22, 1904 (W. D. Kearfott); 1 ♀, Fla., no. 259 (coll. Prof. C. H. Fernald); 7 ♀, Harpers Ferry, Va., July, August, 1892, U. S. Dept. Agr. no. 4330 (T. Pergande); 1 ♀, Ohio, 1 ♀ without label (coll. U. S. Nat. Mus.).

The larva has been described by Mr. Hart. He says the favorite food of the larva is *Vallisneria spiralis* and that it has also been found upon *Potamogeton nutans*. They feed at first exposed on the leaf but later two or even three leaves are loosely webbed together face to face by each larva. The cocoon is fine and dense. Full grown larvæ and pupæ were obtained in July. Later they occurred in floating cases made by cutting loose the larval retreats and they were still to be found in September and October. The method of hibernation is not proven though a larva is recorded in December and they doubtless hibernate as larvæ in the water.



*Larva.* Head pale, faintly mottled, sutures light yellowish brown, setae long, clypeus margined in front with dark brown; ocelli five with angular black pigment spots. Body whitish; tubercles normal, small, the setae short, iv and v superposed subventrally, rather remote. Five pairs of filamentous branched gills on each side on each segment except on head, prothorax and terminal segment; the mesothorax lacks one pair, the penultimate segment lacks all but one pair, there being just 100 in all. The gills have each from three to five branches with some variation, which Hart tabulates. They increase also in number in the several stages. Hart tabulates six stages, in which the number of branches of the gills of the first four abdominal segments varies from one in stage 1 to six at maturity. The gills are situated: subdorsal anterior, below tubercle i; subdorsal posterior, above tubercle ii; subventral anterior, before tubercles iv + v; subventral posterior, behind tubercles iv + v; pedal, behind tubercle vi. Abdominal feet short, normal, the crochets in a wide complete ellipse.

*Pupa.* Spiracle-bearing segments broadest, slightly swollen dorsally, tapering gradually to each end. Rather soft bodied, pale-yellowish white, the eyes darker; smooth. Head small with two dehiscant spine-like porrect setae on the vertex. Spiracles of segments 2 to 4 of the abdomen large and conspicuous, borne on round tubercles. Ventral sheath reaching a little beyond end of 7th segment; 9th segment beneath with a faint elevated line at middle and a small elevation on each side, the anterior margin conspicuously elevated into a broad transverse ridge bearing a row of seven sharp, brownish, short, longitudinal carinae; a V-shaped impression beneath.

#### ***Nymphula badiusalis* Walker.**

*Cymoriza badiusalis* Walker, Cat. Brit. Mus., xix, 955, 1859.

*Oligostigma curviferalis* Walker, Cat. Brit. Mus., xxxiv, 1331, 1865.

*Oligostigma albalis* Robinson, Ann. N. Y. Lyc. nat. hist., ix, 153, 1869.

*Oligostigma albalis* Grote, New ch. list. No. Am. moths, 54, 1882.

*Hydrocampa albalis* Fernald, Smith list Lep. Bor. Am., no. 4170, 1891.

*Paraponyx albalis* Hart, Bull. Ill. Sta. lab. nat. hist., iv, 173, 1895.

*Nymphula badiusalis* Hampson, Trans. ent. soc. Lond., 142, 1897.

*Nymphula badiusalis* Fernald, Bull. 52, U. S. Nat. Mus., no. 4492, 1903.

♂. Inner margin long, outer convex, not oblique. White; a marginal yellow band on both wings finely edged with fuscous. On fore wing a fuscous submarginal band; a discal ringlet with yellow spot below; a costal bar beyond, joining the ringlet and continued inwards and over submedian interspace to margin. Hind wing with two nearly straight fuscous bands. Below the markings repeated faintly. Expanse, 15 mm.

♀. The fore wings are more pointed than the male, the outer margin more oblique. The markings do not differ. Expanse, 22 mm.

Canada (Walker); N. Y., Pa. (Robinson); No. Ill. and So. Wis., June 19, August 3, 4, 9, 30, September 5, 6, 30 (Hart).

1 ♂ (coll. Prof. C. H. Fernald); 1 ♂, Va., September 16, 1880 (U. S. Dept. Agr.); 1 ♂, Ill., August 6 (Bolter); 4 ♂, 2 ♀, Washington, D. C., June 13, 1883, June and July, 1899, August 4,

1879, August 25 (Pergande, Koebele, Busck, Caudell); 1 ♀, Ohio (W. C. Metz); 1 ♂, Aurora, W. Va., August 30, 1904 (O. Heide-mann); 4 ♂, 6 ♀, Rhinebeck, N. Y., August 1885, July 27, 1887, July 8, 30, 1888, Ulster Co., N. Y., September 6, 1887, July 2, 16, 1888 (H. G. Dyar).

The larva appears to be undescribed. Hart remarks that it is "doubtless very close to" that of the preceding species. The adult is common throughout the Atlantic states and Mississippi valley, flying over water.

***Nymphula oblitalis* Walker.**

*Isopteryx? oblitalis* Walker, Cat. Brit. Mus., xvii, 399, 1859.

• *Paraponyx obscuralis* Möschler, Verh. zool.-bot. Ges. Wien., 432, 1872.

• *Hydrocampa proprialis* Fernald, Ent. Amer., iv, 37, 1888.

*Hydrocampa oblitalis* Fernald, Smith List Lep. Bor. Am., no. 4167, 1891.

*Hydrocampa oblitalis* Hart, Bull. Ill. Sta. lab. nat. hist., iv, 176, Pl. II, figs. 7-12, 1895.

*Nymphula oblitalis* Hampson, Trans. ent. soc. Lond., 141, 1897.

*Nymphula oblitalis* Fernald, Bull. 52, U. S. Nat. Mus., no. 4496, 1903.

♂. All obscured, blackish or brown. Discal dot small, white, surrounded by a white line, which may expand into a cloud, touching costa; a faint lighter line across middle of wing and a subbasal dilution. Hind wing blackish brown with a faint mesial white line. Lighter specimens approach the female more closely in markings. Expanse 13 mm.

♀. Lighter, the marks less obscured. The ground color is overspread with blackish and ochereous; a subbasal dark line edged with white without; a median shade, black, edged with white without, expanded below, sending a black shade about the large white reniform discal spot; a subterminal black shade. Hind wing with the mesial lines pale, joining at the anal angle, enclosing a pale discal mark on a dark ground, or nearly completely overspread with brown. Expanse 28 mm.

Fla., 'Tex. (Fernald); Ill. (Hart).

1 ♂, 1 ♀ "from aquatic larva on water lilies" Florida, March, 1888, no. 4261 (U. S. Dept. Agriculture); 1 ♂, Texas (Boll); 2 ♂, Victoria, Texas (E. A. Schwarz); 1 ♂, 1 ♀, Somerville, S. C., April, 1899 (R. Ottolengui); 1 ♀, Palm Beach, Fla., February 4, 1900 (H. G. Dyar); 1 ♂, 2 ♀, Rhinebeck, N. Y., August 9, 1887, July 26, August 18, 1888 (H. G. Dyar); 1 ♀, West Palm Beach, Fla. (Dyar & Caudell); 2 ♂, Green Cove Springs, Fla., March (Dyar & Caudell); 1 ♂, 3 ♀, St. Louis, Mo., July 14, August 28, September 25, 1904 (H. McElhose); 3 ♀, Los Angeles, Cal. (D. W. Coquillett); 1 ♀, Fla. (coll. Prof. C. H. Fernald); 1 ♀, Texas, labelled "*Hydrocampa gyralis* Hulst, type" in Dr. Hulst's writing (coll. Prof. C. H. Fernald); 1 ♀, Claremont, Cal. (C. F. Baker).

The larva has been well described and figured by Hart. He says that the favorite home of the species is among the floating leaves of *Potamogeton nutans*. The amber-colored eggs are laid in a long band just within the margin, on the lower surface, of some broad floating leaf. They are closely placed in a single layer, in rows running parallel to the margin, the band being about 3 mm. wide and including usually five or six rows of eggs. The band is usually an inch or two long. The single egg is oval, flattened, one surface broadly gummed to the leaf, the other finely longitudinally wrinkled, a longitudinal elevated ridge at middle. Length .6 mm., width .4 mm. Young larvæ were obtained in July. The next day they had cut out minute oval disks from the leaf and webbed these to its lower surface. When a little older the larva cuts loose the portion of leaf surface to which it has attached its shelter and is thereafter found travelling about in a lens-shaped case. In larger cases the posterior end is narrowed. Full grown larvæ occurred in August, but larvæ could be found all Summer to October. The imagoes likewise occurred all the season, becoming commoner, most abundant in August and September. The method of hibernation is not stated. The young larva does not differ markedly from the mature one. Mr. Hart says that in the first stage the setæ are more conspicuous and the ocelli are closely approximate, the lower three in a solid oblong dash.

*Larva.* Head rather small, light brownish yellow, sutures narrowly darker, bordered on each side with whitish; a lateral brown stripe from base of head nearly to ocelli; ocelli five, their pigment spots large and confluent. Body subcylindrical, dirty whitish; cervical shield semicircular, bisected; tubercles of thorax indicated by dark rings, abdominal ones indistinct; spiracles of anterior abdominal segments more distinct, remaining ones minute and inconspicuous; ninth abdominal segment above broadly retuse, tenth feebly impressed above at middle. Abdominal feet very short, the hook-bearing area narrow, with two rows of light-colored hooks. No filamentous gills, but aquatic in habit.

*Pupa.* Rather rapidly narrowed behind, smooth, pale yellowish, wings and head darker. Head with two small dehiscent black spine-like porrect setæ on the vertex. Spiracles of segments 2 to 4 round, elevated, reddish brown, with a pale center and blackish ring; very large, the anterior pair much smaller. Ventral sheath reaching the seventh abdominal segment; ninth with a sharp tooth each side above lateral margin; the last two segments grooved and impressed below.

#### ***Nymphula nomophilalis*, new species.**

Wings elongate, narrow, recalling *Nomophila noctuella* D. & S. Fore wing dark brown with a bronzy reflection, uniform in the female, lightened in two patches

in the male, over middle of cell and beyond discal dot; two discal dots and outer and inner lines indicated in plumbeous scales, the latter excurved over cell, simple in the female, indicated by a white costal line in the male just beyond the light discal patch; a subterminal band of scattered plumbeous scales. Hind wing gray-brown, three black patches on inner margin, two faint submarginal whitish lines, most distinct before anal angle. Fore wings below unmarked, gray-brown; hind wing gray-brown with the outer lines repeated. Expanse, 20 to 22 mm.

1 ♂, 2 ♀, Hastings, Fla., April (W. D. Kearfott); 3 ♀, Charlotte Harbor, Fla., March, Lake Worth, Fla. (Mrs. Slosson) and Texas, March (coll. Prof. C. H. Fernald); 1 ♀, Cocoanut Grove, Fla. (E. A. Schwarz).

Type No. 9493, U. S. Nat. Mus.

#### *Nymphula gyralis* Hulst.

*Hydrocampa gyralis* Hulst, Trans. Am. ent. soc., xiii, 159, 1886.

*Hydrocampa gyralis* Fernald, Smith list Lep. Bor. Am., no. 4172, 1891.

*Hydrocampa gyralis* Hart, Bull. Ill. Sta. lab. nat. hist., iv, 175, 1895.

*Nymphula dentilinea* Hampson, Trans. ent. soc. Lond., 139, 1897.

*Nymphula gyralis* Fernald, Bull. 52, U. S. Nat. Mus., no. 4489, 1903.

♂. Wing shape the same as the female. Fore wings with the ground overwashed with ochereous and gray or entirely gray, leaving narrow white edges to the markings. Discal dot large, reniform, white, edged with black without; a black triangle with white mark without on middle of costa and spot opposite it on internal margin, both white-edged; a small spot cut by white subapically, in well-marked specimens joined to the outer edge of reniform and beneath it to the middle costal spot, a fine white line being continuous, though broken in pale specimens; a black subbasal toothed line: a terminal white line, touching margin at middle, produced inward between the veins, diffused. Hind wing nearly white, a little ochereous shaded; central lines white, diverging mesially, edged within with gray and enclosing a white discal space and a smaller one near margin; a white terminal space, followed by a dark line. Markings not sharply defined, varying to subobsolete. Expanse, 17 to 21 mm.

♀. Fore wings suffused and obscured, unicolorous, only slight traces of the markings persistent. Sordid ochereous, brown-gray or dark cinereous, very variable in color. Hind wings as in the male but more faintly marked, in white and pale gray only. Expanse, 18 to 24 mm.

Professor Fernald has sent me a specimen purporting to be one of Hulst's types of *gyralis*, but it is a ♀ of *N. oblitalis* Walk. from Texas, a locality not mentioned by Hulst in his original description, and it is obviously a spurious type. The sexes are strongly dimorphic. Hart correctly identifies the female, of which I have many, taken in company with normal males.

Georgia, Florida (Hulst.); Urbana, Ill., June 17, July 19, August 24 (Hart); Florida (Hampson).

1 ♀, Mass. (coll. Prof. C. H. Fernald); 1 ♂, 1 ♀, Miami, Fla., (Mrs. Slosson); 1 ♂, no. 264, labelled "*Hydrocampa gyralis* Hulst, homotype" in Prof. Fernald's writing (coll. Prof. C. H. Fernald); 4 ♂, 1 ♀, Miami, Fla. (W. Barnes); 2 ♂, 2 ♀, Cocanut Grove, Fla. (E. A. Schwarz); 1 ♀, Crescent City, Fla., on blue water lily (H. G. Hubbard); 1 ♀, Palm Beach, Fla., February 16, 1900 (H. G. Dyar); 1 ♂, St. Louis, Mo., September 8, 1904 (H. McElhose); 1 ♀, Weekapaug, R. I., August 29, 1904 (H. G. Dyar); 11 ♂, 9 ♀, Big Tupper Lake, N. Y., August 26, 1905 (H. G. Dyar).

The larva appears to be undescribed. The adults occurred to me at Tupper Lake, N. Y., flying on the leaves of water lilies in company with *N. maculalis* Clem. They had evidently bred there as undeveloped specimens were seen on the leaves. Larvæ occurred on the plants in cases made of pieces of leaf, attached either to the leaf or lower down on the gelatinous stem. The larvæ were abundantly supplied with tracheal filaments as Hart describes for *Nymphula obscuralis* Grote; but it proved impossible to breed them as they hibernated in the water as larvæ, so I do not know to which species they belong.

#### *Nymphula nebulosalis* Fernald.

*Hydrocampa nebulosalis* Fernald, Ent. Amer., iii, 127, 1887.

*Hydrocampa nebulosalis* Fernald, Smith list. Lep. Bor. Am., no. 4173, 1891.

*Nymphula nebulosalis* Fernald, Bull. 52, U. S. Nat. Mus., no. 4488, 1903.

Fore wing rather bright ochereous yellow, the markings black, edged with white. The markings are as in *N. gyralis* Hulst, but more diffused and partly lost in a brown shade that overspreads the terminal and central parts, leaving a broad yellow area without the discal mark; this mark is narrow, lunate; subterminal line retreating from the margin below, sometimes interrupted. Hind wing white in the middle, the base and a large discal mark yellow; mesial lines black, separating centrally to enclose the discal yellow patch; a broad yellow or fuscous yellow subterminal band; termen yellow with black line within. Legs spotted with white and fuscous yellow, Expanse, 15 to 18 mm.

This species is allied to *N. gyralis* Hulst, but the sexes are alike. It is even more nearly related to *N. icciusalis*, Walk., from which it differs only in being smaller and darker, the marks overspread with brown.

Florida (Fernald).

2 ♀, Fla. (coll. Prof. C. H. Fernald); 1 ♂, Fla. (coll. U. S.



Nat. Mus.); 1 ♂, 1 ♀, Hastings, Fla., May (G. D. Hulst); 4 ♀, Hastings, Fla., April (W. D. Kearfott).

Nothing is known of the life history.

#### *Nymphula icciusalis* Walker.

- *Leucochroma icciusalis* Walker, Cat. Brit. Mus., xix, 971, 1859.
- *Leucochroma faulalis* Walker, Cat. Brit. Mus., xix, 973, 1859.
- *Hydrocampa ? formosalis* Clemens, Proc. Acad. Nat. Sci. Phil., xii, 217, 1860.
- *Hydrocampa genuialis* Lederer, Wien. Ent. Mon., vii, 451, 1863.
- *Hydrocampa genuinalis* Lederer, Wien. Ent. Mon., vii, pl. 18, f. 2, 1863.
- *Hydrocampa pocalis* Grote, Papilio, i, 17, 1881.
- Hydrocampa formosalis* Grote, New Ch. List No. Am. Moths, 54, 1882.
- Hydrocampa formosalis* Packard, Amer. Nat., xviii, 824, 1884.
- Hydrocampa icciusalis* Fernald, Smith List Lep. Bor. Am., no. 4174, 1891.
- Hydrocampa icciusalis* Hart, Bull. Ill. Sta. Lab. Nat. Hist., iv, 176, 1895.
- Nymphula icciusalis* Hampson, Trans. Ent. Soc. Lond., 139, 1897.
- Nymphula icciusalis* Fernald, Bull. 52, U. S. Nat. Mus., no. 4487, 1903.

Wings white, marked between the lines with defined areas of ochereous yellow or ochereous brown; discal mark defined without by a black line; a black line for costal triangle; a black ring for the mark on inner margin; a black subterminal line, retreating below the middle; fringes spotted with black. Hind wing with the central black lines diverging in the middle, enclosing a yellow discal patch; subterminal line fine, irregular. Expanse 15 to 23 mm.

The sexes are alike. The markings are as in *N. gyalis* Hulst and *N. nebusosalis* Fernald, but well defined, the dark patches white centered and only the outlines black.

Lake Teedyuscong, Pike Co., Pa. (Clemens); Providence, R. I. (Packard); New York (Grote); Urbana, Ill., May 19, 31, June 3, 15, 26, July 5, 6, 7, 20, 21, 28, August 2, 17, 24; Lake Geneva, Wis., September 3 (Hart).

3 ♂, 5 ♀, Fla., Pa., Orono, Maine (coll. Prof. C. H. Fernald); 3 ♂, 8 ♀, N. H., Mass., N. Y., Ohio (coll. U. S. Nat. Mus.); 1 ♂ from P. C. Zeller labelled "*Hydrocampa genuinalis* Led."; 2 ♂, 2 ♀, nos. 8338, 15812, 15813 and "dugway" June 25, 1859 (coll. Asa Fitch); 6 ♀, Rhinebeck, N. Y., June 10, 11, 15, July 30, 1888 (H. G. Dyar); 1 ♂, Sandusky, Ohio, July 7, 1903 (W. C. Metz); 8 ♂, 12 ♀, Center Harbor, N. H., July 10, 1902 (H. G. Dyar).

The larva has been nominally figured by Dr. Packard. Hart mentions it as probably allied to that of *N. oblitalis* Walk. The adults fly in grass near or on the shore, not out on the water or even over the water, being easily reached with the net from dry ground. The

larvæ probably feed on water grasses rather than lilies. Dr. Packard figures a larva without tracheal filaments and gives a number of details, which it is scarcely worth while to reproduce here as his larva was not bred and may not belong to this species.

***Nymphula ekthlipsis* Grote.**

*Hydrocampa ekthlipsis* Grote, Can. ent., viii, 111, 1876.

*Hydrocampa ekthlipsis* Grote, New ch. list, No. Am. moths, 54, 1882.

*Hydrocampa ekthlipsis* Fernald, Smith list, Lep. Bor. Am., no. 4175, 1891.

*Hydrocampa ekthlipsis* Hart, Bull. Ill. Sta. lab. nat. his., iv, 176, 1895.

*Nymphula ekthlipsis* Hampson, Trans. ent. soc. Lond., 139, 1897.

*Nymphula ekthlipsis* Fernald, Bull. 52, U. S. Nat. Mus., no. 4400, 1903.

Body white, the thorax spotted with black, the abdominal segments banded. Wings ochereous yellow; a subbasal white band edged with black; a small white dot in cell, black-edged; a white triangle on costa opposite to, and sometimes confluent with a round mark on inner margin, black-edged; discal spot large, round, joined to costa, black-edged; subterminal line white, lunate within, black-edged without; fringes spotted. Hind-wing white, black central lines remote and rather straightened, the inner with a yellow basal edge; discal mark reniform, yellow, black-edged, subdivided; beyond outer line a yellow area terminated in a dentate black line; margin yellow, edged with black lines. Expanse, 20 to 25 mm.

The species is allied to *N. icciusalis* Walk., but the markings are further modified in the same direction and are more ornate and distinct. The sexes are alike.

Albany, N. Y. (Grote); Champaign, Ill., July 5 (Hart).

1 ♀, Amherst, Mass., "homotype" (C. H. Fernald); 1 ♀, Western Manitoba (A. W. Hanham); 15 ♂, 18 ♀, Center Harbor, N. H., June 23, 25, 1902 (H. G. Dyar).

The larva is unknown. I took the adults commonly flying over water in reeds at the shore of the lake in company with *N. icciusalis* Walk., but further out, so that they could not be reached from dry ground.

**Genus OLIGOSTIGMA Guenée.**

*Oligostigma* Guenée, Spec. Gén., viii, 260, 1854.

*Oligostigma* Hampson, Trans. ent. soc. Lond., 167, 1897.

Palpi upturned, the second joint moderately fringed with hair in front and reaching vertex of head, the third well developed and acuminate; maxillary palpi long and dilated with scales at extremity; frons rounded; antennæ of male usually annulated; ocelli rarely prominent; legs long, the tibiae smooth, with the spurs almost equal. Fore wing with veins 3, 4, 5 from angle of cell; 7 straight and well separated from 8, 9, 10. Hind wing with the cell about half the length of the wing; veins 3, 4, 5 from angle; 6, 7 from upper angle; 7 strongly anastomosing with 8; the outer margin excised below apex, then lobed (Hampson).

*Synopsis of Species.*

Outer margin of hind wings with a slight subapical indentation.....**seminealis**.  
 Outer margin of hind wing distinctly indented subapically, crenulate.....**vittatalis**.

**Oligostigma seminealis Walker.**

*Oligostigma seminealis* Walker, Cat. Brit. Mus., xvii, 430, 1859.

*Eustales tedyuscongalis* Clemens, Proc. Acad. Nat. Sci., Phil., xii, 216, 1860.

*Paraponyx tedyuscongalis* Grote, New ch. list No. Am. moths, 64, 1882.

*Oligostigma semineale* Hampson, Trans. Ent. Soc. Lond., 167, 1897.

*Oligostigma juncealis* Fernald (not Guenée), Bull. 52, U. S. Nat. Mus., no. 4502, 1903.

♂. Fore wing fuscous, shaded with ochereous; a white outer band bent at right angles inward in submedian space, becoming obscure on inner part; a faint black discal mark and median shade; a narrow white submarginal line with a black hair-line without; margin fulvous. Hind wing white; a median straight black band; an outer broader band separated from the fuscous margin by a narrow white line, partly replaced by fulvous at apex and center of outer margin. Small black spots on margin with minute pupils. Below as above, slightly fainter. Expanse 18 mm.

♀. Unknown.

This species has been erroneously referred in our lists to *O. juncealis* Guen. from South America. The two species are really distinct. I have a fine series of the true *juncealis* from Brazil and the Guianas (W. Schaus).

Lake Teedyuscong, Pike Co., Pa. (Clemens).

1 ♂, Cocoanut Grove, Fla. (E. A. Schwarz).

**Oligostigma vittatalis, new species.**

Body brown with whitish on sides of thorax and abdominal rings. Fore wings silvery white; basal third dark brown, cut by a white subbasal line and one just at edge, cutting off a linear dark inner line; outer line linear, dark, curved to below cell, then straight to margin, the curve to costa filled in with dark over the discal mark, which shows obscurely as two parallel darker lines. A broad subterminal shade, separated by white from the outer line and terminal dark shade, the latter narrow, sinuous; fringe spotted black and white with a black basal line. Hind wing marked in the same manner, the outer line a little less decidedly bent, the terminal shade enclosing faint orange shading at the margin. Expanse, 14 to 18 mm.

2 ♂, Biscayne Bay, Fla. (Mrs. Slosson); Hastings, Fla., April (W. D. Kearfott),

Type no. 9496, U. S. Nat. Mus.

The species resembles in appearance *Diasemia ramburialis* Dup.

**Genus AMBIA Walker.**

*Ambia* Walker, Cat. Brit. Mus., xix, 957, 1859.

*Opistheideicta* Warren, Ann. Mag. Nat. Hist. (6), v, 478, 1890.

*Oligernis* Meyrick, Trans. Ent. Soc. Lond., 470, 1894.

*Leucogephyra* Warren, Ann. Mag. Nat. Hist. (6), xviii, 219, 1896.

*Ambia* Hampson, Trans. Ent. Soc. Lond., 159, 1897.

Palpi upturned, the second joint reaching vertex of head and nearly naked, the third long and acuminate; maxillary palpi filiform and of moderate length; frons rounded; legs of moderate length, the spurs long and equal. Fore wing with the apex slightly produced, the outer margin somewhat excised below apex; veins 3, 4, 5 usually from angle of cell; 7 straight and well separated from 8, 9, 10. Hind wing with the apex produced, the outer margin somewhat excised below apex and with two excisions towards anal angle; the inner margin very short; veins 3, 4 from angle of cell; 5 usually from somewhat above angle; 6, 7 from upper angle (Hampson).

***Ambia striatalis*, new species.**

Shining white; all the interspaces of both wings from middle to margin broadly streaked with brown. Fore wing subfalcate at apex, margin crenulate; hind wing sharply crenulate, excavate opposite cell and at anal angle. Fore wing brown at base, the disk white, confusedly shaded in dull ochre; a white line from costa at outer fourth, bent in below cell and reaching margin at middle, obscured by a brown shade, the space beyond streaked in brown. Hind wing white at base; a mesial brown band, enclosing near its edges on each side a white line, the outer of which is roundedly waved; space beyond to margin brown streaked. Expanse, 18 to 20 mm.

1 ♂, 1 ♀, Charlotte Harbor, Fla., March (Mrs. Slosson).

The types are in the collection of Prof. C. H. Fernald.

**Genus *ELOPHILA* Hübner.**

*Elophila* Hübner, Tentamen, 2, 1806.

*Cataclysta* Hübner, Verz. bek. Schmett., 363, 1827.

*Chrysendeton* Grote, Pap., i, 16, 1881.

*Anydraula* Meyrick, Trans. Ent. Soc. Lond., 427, 1885.

*Cataclysta* Hampson, Trans. Ent. Soc. Lond., 147, 1897.

Palpi upturned, the second joint reaching vertex of head and slightly fringed with hair in front, the 3d long and acuminate; maxillary palpi small and filiform; frons rounded; antennæ annulate with rings at the joints; legs long and slender, the spurs long and nearly equal. Forewing with veins 3, 4, 5 from angle of cell; 7 straight and well separated from 8, 9, 10. Hind wing with veins 3, 4, 5 from angle of cell; 6, 7 from upper angle or stalked (Hampson).

*Synopsis of Species.*

Hind wings without a black powdered space between disk and termen.

Both wings dark gray; hind wings with submarginal line.....**brunnildalis.**

Ground color white; no continuous submarginal line.

Hind wings with a black costo-discal bar .....**bifascialis.**

Hind wings without such a bar .....**drumalis.**

Hind wings with such a black powdered space.

Fore wings with the subterminal silvery bar narrowing to apex or detached; silvery spots on wing rounded, separate.

- An angular white spot above middle of inner margin.....**claudialis**.  
 This spot not present.....**slossonalis**.  
 Fore wing with the subterminal mark a costo-apical dash diminishing below ;  
 markings of confused lines.  
 Fore wing with defined silvery white patches, especially an angular one  
 above inner margin ; marginal dots of hind wings pupilled..**magnificalis**.  
 Fore wing variable but without this patch ; marginal dots of hind wing not  
 ocellate.  
 Hind wing with a white area before the marginal dots.  
 Small ; no yellow beyond mesial line on hind wing.....**fulicalis**.  
 Larger ; a yellow extra-mesial bar.....**cronialis**.  
 Hind wings all dark gray to the margin.....**schæfferalis**.

**Elophila brunnildalis, new species.**

Fore wings dark brown, lighter in median space and about anal angle ; no lines visible on basal portion : inner line near middle, dark, slender, slightly waved, narrowly separated from the basal dark area by a light space ; outer line at outer third, erect, dentate, slender, dark, relieved without by a light space ; there is a faint indication of a line from its middle towards outer margin, being the remains of the out-curve seen in *onyxalis* Hampson, but here almost completely obsolete ; an illy defined pale submarginal line. Hind wings sordid gray, darker before antemesial pale area, which limits a faint mesial dark wavy line that joins the discal ringlet ; space beyond gray without any black scaling ; marginal black spots from apex to middle in a gray field, with some metallic scales, edged within by a slender wavy black line, that runs submarginally to anal angle. Expanse, 18-22 mm.

Three ♀♀, Walters Station, California, April, from Mr. W. D. Kearfott, presumably collected by G. H. Huston ; one type in the U. S. National Museum, two in Mr. Kearfott's collection.

Type no. 9784, U. S. Nat. Mus.

**Elophila bifascialis Robinson.**

*Cataclysta bifascialis* Robinson, Ann. Lyc. Nat. Hist. N. Y., ix, 154, 1869.

*Cataclysta bifascialis* Grote, New ch. list No. Am. moths, 54, 1882.

*Cataclysta bifascialis* Fernald, Smith, list. Lep. bor. Am., No. 4156, 1891.

*Cataclysta bifascialis* Hampson, Trans. Ent. Soc. Lond., 149, 1897.

*Elophila bifascialis* Fernald, Bull. 52, U. S. Nat. Mus., No. 4499, 1903.

Wings long and narrow ; fore wing finely powdered with black on a white ground ; a mesial ochreous band edged with gray, cut by a white line on costal half ; four other bands occupying distal third of wing, converging on tornus and separated apically by two white wedge-shaped marks ; the subterminal one shades below into metallic scales ; fringe gray. Hind wing white ; a terminal series of round black spots edged with a metallic terminal line ; a costo-discal black bar, submaculate, resting on a sordid costal area ; a discal orange mark bordered basally and outwardly by an oblique gray bar with metallic sheen ; inner area white with a gray spot above tornus. Expanse 12 to 18 mm.



Texas (Robinson).

4 specimens, one labelled Texas (coll. Prof. C. H. Fernald); 17, Texas (Belfrage); Victoria, Texas, March 22, 27, 31 (E. A. Schwarz); Kerville, Tex. (W. Barnes); Roswell, N. Mex., August 22 (T. D. A. Cockerell); Harpers Ferry, Va., August 29, 1888 (T. Pergande); Plummer's Island, Md. (A. Busck).

*Ab. a.* The fore wings are reddish brown, obscuring the markings. Texas.

*Ab. b.* The costo-discal bar of hind wings is light bluish gray, edged with black. Texas.

*Ab. c. kearfottalis*, new variety. Hind wings with the black bar replaced by two wavy black lines, filled by the white ground color; a broken black line between this and the outer marginal spots in three of the specimens.

3, Phoenix, Arizona, May (R. E. Kunzé); 1, without label (coll. W. D. Kearfott).

Type no. 9637, U. S. Nat. Mus.

I have seen no reference to the larva of this species.

#### ***Elophila drumalis*, new species.**

Silvery white; fore wings shaded with pale ocher, leaving two outer lines which converge toward tornus; a broad inner yellowish band. Hind wing with a pale yellow inner spot and a discal one; outer margin with the black spots diffused, separated by metallic scales, duplicated within by a series of short black lines. Expanse 10 mm.

1 ♀, Fort Drum, Florida (U. S. Dept. Agr.).

Type no. 9491, U. S. Nat. Mus.

#### ***Elophila claudialis* Walker.**

*Cataclysta claudialis* Walker, Cat. Brit. Mus., xvii, 437, 1859.

• *Cataclysta medicinalis* Grote, Pap., i, 15, 1881.

*Chrysandeton medicinalis* Grote, new ch. list No. Am. moths, 54, 1882.

*Chrysandeton claudialis* Fernald, Smith list Lep. bor. Am., no. 4153, 1891.

*Chrysandeton claudialis* Hart, Bull. Ill. Sta. lab. nat. hist., iv, 174, 1895.

*Cataclysta medicinalis* Hampson, Trans. ent. soc. Lond., 149, 1897.

*Cataclysta claudialis* Hampson, Trans. ent. soc. Lond., 151, 1897.

*Elophila claudialis* Fernald, Bull. 52, U. S. Nat. Mus., no. 4498, 1903.

Fore wings brown-gray; a white subbasal band narrowed to costa; a rounded triangular white patch in centre of wing; an oblique mark from outer third of costa; a subterminal white line, not attaining anal margin angle; a terminal yellow line. Hind wing white; a mesial brown-gray band narrow centrally, subfurcate on costa; containing a small ocherous space; disk powdered with black scales; a terminal row of round black spots with some metallic scales, set in a yellow margin. Expanse 11, to 13 mm.

"United States" (Walker); Carbondale, Ill. (Grote); Champaign, Ill., June 21 (Hart).

9 specimens, Central Mo., Fla. (coll. Prof. C. H. Fernald); 3, North Carolina (Morrison); Tryon, N. C. (W. F. Fiske); 2, Washington, D. C. (coll. C. V. Riley); 2, D. C., July 1 (A. Busck); Hastings, Fla., June (G. D. Hulst); Fort Drum, Fla. (U. S. Dept. Agr.); Pittsburgh, Pa., July 8, 1905 (H. Engel).

*Ab. a.* Smaller and darker, the white marks reduced in size, the outer oblique mark narrow or absent.

Hastings, Fla.

The larva is undescribed.

#### ***Elophila slossonalis*, new species.**

Fore wing brown-gray; a broad straight subbasal band, white or light brown suffused; an outer fine pale line, oblique from costa; sharply angled inward, then oblique again to inner margin near tornus; subterminal band straight, white above, metallic below; terminal space faintly orange. Hindwing whitish, a dark clouded mesial band containing an orange discal mark; disk powdered with black scales; terminal black spots separated by metallic scales, set in a faintly orange terminal area. Expanse, 13 mm.

This is not improbably *E. guenealis* Snellen (*Paraponyx guenealis* Snellen, Tijds. voor Ent., xviii, 260, 1875) described in an article on the Pyralidæ of New Grenada, St. Thomas and Jamaica; but the white band is quite obscured in Snellen's figure and there are a number of differences in detail. I prefer therefore, to hold our form separate, at least until the receipt of specimens from the West Indies.

4 specimens, Charlotte Harbor, Florida, March (Mrs. Slosson); Glenwood, Fla. (Dr. Barnes), all from Prof. C. H. Fernald's collection.

#### ***Elophila magnificalis* Hübner.**

*Pyralis magnificalis* Hübner, Eur. Schmett., vi Horde, die Zünsler, 18, 1776, Pl. 16, f. 104, 1796.

*Cataclysta lamialis* Walker, Cat. Brit. Mus., xvii, 436, 1859.

*Cataclysta ? heliopalalis* Clemens, Proc. Acad. nat. sci. Phil., xii, 218, 1860.

*Chrysandeton heliopalalis* Grote, New ch. list no. Am. moths, 54, 1882.

*Chrysandeton lamialis* Fernald, Smith list Lep. bor. Am., no. 4154, 1891.

*Cataclysta magnificalis* Hampson, Trans. ent. soc. Lond., 149, 1897.

*Elophila magnificalis* Fernald, Bull. 52, U. S. Nat. Mus., no. 4497, 1903.

Ground color of wings silvery white with gray-brown lines; a subcostal streak to three fourths; a faint inner line closely followed by a distinct one that sends a bar in cell to the very irregular outer line; this starts on costa at end of subcostal bar,

runs obliquely nearly to tornus, then returns to discal dot, bends again to an angle on vein 1c and ends on middle of inner margin; a gray line from costa before apex to middle of outer margin; a subterminal gray line; termen pale ocherous; an ocherous line from tornus into the loop of outer line, edged with gray. Hind wings with inner and outer mesial gray lines; disk strigose dotted with black; terminal black spots large, metallic pupilled, set in a pale ocherous field. Expanse, 23 mm.

"England" (Hübner) [an error]; "United States" (Walker); Lake Teedyuscong, Pike Co., Pa. (Clemens).

4 specimens, Amherst, Mass., Orono, Maine (coll. Prof. C. H. Fernald).

The larva is unknown.

#### *Elophila fulcalis* Clemens.

*Cataclysta fulcalis* Clemens, Proc. acad. nat. sci. Phil., xii, 217, 1860.

• *Cataclysta angulatahs* Lederer, Wien. ent. Mon., vii, 486, 1863.

• *Cataclysta confusalis* Walker, Cat. Brit. Mus., xxxiv, 1334, 1865.

• *Chryseudeon avernalis* Grote, Trans. Kans. acad. sci., viii, 53, 1878.

*Cataclysta fulcalis* Grote, New ch. list No. Am. moths, 54, 1882.

*Cataclysta avernalis* Fernald, Smith list Lep. bor. Am., no. 4157, 1891.

*Cataclysta fulcalis* Hampson, Trans. ent. soc. Lond., 149, 1897.

*Elophila fulcalis* Fernald, Bull. 52, U. S. Nat. Mus., no. 4500, 1903.

Fore wing gray with white lines; two costal streaks converge toward tornus; two inner transverse lines, a discal spot and rounded area on middle of inner margin, all white. Hind wings white; a mesial broad gray band; disk powdered with dark scales, with a fine gray line limiting this area within; terminal black dots separated by metallic scales in a yellow field. Expanse, 12 to 15 mm.

Marked after the pattern of *E. magnificalis*, but the white marks reduced or obsolete, the black dots of hind wing not pupilled.

Easton, Pa. (Clemens); "North America" (Walker); New Mexico (Grote).

20 specimens, Amherst, Mass., Chicopee, Mass. (coll. Prof. C. H. Fernald); 8, Texas; 2, Hot Springs, Arizona, cotypes of *avernalis* Grote (coll. Fernald); Montclair, N. J., June 9, 1899 (W. D. Kearfott); 10, N. H. (coll. U. S. Nat. Mus.); Columbus, Ohio, May 25 (W. C. Metz); Plainfield, N. J. (Mrs. F. O. Herring); New Brighton, Pa., August 20, 1902 (H. D. Merrick); 2, New York, nos. 2819 and "dugway" June 25, 1859 (coll. Asa Fitch); Victoria, Tex., March 31 (E. A. Schwarz); 25, Plummer's Island, Md., June, August (A. Busck); Salem, Oregon, June 26, 1898 (T. Kincaid); Pullman, Wash., August 9, 1898 (C. V. Piper).

*Ab. a. avernalis* Grote. White marks of fore wing lost except subapically, the inner bar continued across wing as a fine flexuous line.

*Ab. b.* White markings absent except subapically, the wing varied with blackish lines and dottings.

Archer, Fla., March 9, 1882 (A. Koebele); Fla. (coll. C. H. Fernald).

*Ab. c.* Larger; orange-ocherous patches interposed between the white terminal marks and in the discal band of hind wings. Expanse, 18 to 28 mm.

Shovel Mt., Texas (W. Barnes); Sonora, Mexico, 40 miles from Arizona line (Morrison); 4, Phoenix, Ariz., April, May (coll. W. D. Kearfott).

The larva is unknown.

#### *Elophila cronialis* Druce.

*Cataclysta cronialis* Druce, Biol. Cent.-Am., Lep. Het, ii, 274, 1896.

*Cataclysta cronialis* Hampson, Trans. ent. soc. Lond., 149, 1897.

Marked like *E. fulicalis*, but very much larger, the middle band of fore wings and space between outer white lines marked with ocher. Hind wings with an ocher bar between the basal shading and outer powdery area before the discal dot. Expanse, 27 to 30 mm.

Jalapa, Mexico (Druce).

2 ♀, Nogales, Arizona, May; Huachuca Mts., Ariz. (Dr. Barnes).

#### *Elophila schaefferalis*, new species.

Similar to *cronialis* Druce, but much darker. Head and body blackish slate gray, black and white scales mixed. Wings dark gray, black scales densely and uniformly irrorate on a white ground. Basal area of fore wings dark; median line angled outward on median vein, narrowly separated from the dark basal area; outer line narrow, dark, faint, curved from costa to tornus whence it sends an obscure loop to just below the clouded discal ringlet; a curved, black subapical band, widest on costa; apex whitish; a black submarginal line, the margin sordid orange. Hind wing without any white spaces, all solidly irrorate with black; base dark, intensified discally; mesial line slender, black, curved, indented on submedian fold, running to anal angle; a small outer discal dot, black, followed by white scales; marginal black marks small, pointed, relieved by sordid orange within and separated by metallic scales. Expanse, 27 mm.

One female, Palmerlee, Cochise Co., Arizona (C. Schaeffer).

The type is in the Museum of the Brooklyn Institute.

#### Genus GESHNA, new.

Palpi upturned, the third joint long and acuminate; maxillary palpi slender smooth, moderate; frons rounded; antennæ with the shaft annulate. Fore wings with veins 7 and 10 stalked. Hind wings with the outer margin curved, bent at a slight angle in the middle.

Type, *G. cannalis* Quaint.

*Synopsis of Species.*

Fore wings light brown with a white discal dot.....**cannalis**.  
 Fore wings yellowish white with complicated dark brown lines .....**primordialis**.

**Geshna cannalis Quaintance.**

*Hydrocampa cannalis* Quaintance, Bull. 45, Fla. Exp. Sta., 68, 1898.

*Nymphula cannalis* Dyar, Proc. Ent. Soc. Wash., iv, 463, 1901.

*Nymphula cannalis* Fernald, Bull. 52, U. S. Nat. Mus., no. 4494, 1903.

Entirely buff-brown, a little purplish-tinted; a quadrate white discal dot with a black dot on inner side and cusp without; inner line fine, black, strongly excurved on median vein; outer punctiform, dentate, regularly outcurved. Hind wing with a fine dentate outer line, somewhat digitately projected on middle segment, the inner segment sharply retracted to lie in line with the discal dot; a fine terminal dark line and line in fringes on both wings. Below paler; fore wings with discal dot as above, but more distinct and with an oblique black line below it; outer line punctiform, slight, bent at an angle on costa. Hind wing with discal dot and outer line, the latter punctiform-dentate, not dislocated. Expanse 18 to 24 mm.

This species probably occurs in the West Indies, but I have not as yet seen a previous description of it.

Florida (Quaintance).

2, Lake City, Fla., November 25, 1896 (A. L. Quaintance); 13, Palm Beach, Fla., February and March, 1900 (H. G. Dyar); 2, Fla. (coll. Prof. C. H. Fernald).

The larva has been fully described by Quaintance as the "Canna leaf roller." He says that the larvæ were injurious to *Canna indica* at Lake City by rolling the leaves and eating out the parenchyma from the inner (upper) side of the leaves. I have observed the same injury to the wild *Canna* at Palm Beach.

*Egg.* Slightly longer than broad; even outline, very flat; clear whitish yellow; surface with irregular hexagonal lines. Size .85 × .93 mm. Laid in patches of six to fifteen.

*Stage I.* Head cordate, yellow, eyes brown. Body cylindrical, slightly tapering, yellowish, somewhat transparent; abdominal feet with a single row of brownish hooks. Tubercles normal, very small, annular; setæ large and stout with slightly swollen tips, normal (seta iib of the thorax is not shown in the figure, but should be present; it is probably so small that the artist overlooked it), primary ones only present, iv and v of abdomen approximate, superposed.

*Stage II.* Head cordate, yellow, clypeus yellowish brown, jaws brownish black; width 1 mm. Body cylindrical, tapering somewhat to the ends, yellowish white, transparent, greenish from the contents of the alimentary canal. Abdominal legs with a circle of stout brown hooks. Tubercles normal, subprimary ones present, the tubercles of thorax and i to iii of abdomen expanded into large plates; ia + ib,



ii + iib and iv + v on thorax, iv and v closely approximated and superposed on abdomen.

*Pupa.* Chocolate brown, abdomen somewhat lighter, cremaster eight stout, dark brown hooks; length, 11.5 mm.

***Geshna primordialis*, new species.**

Wings pale yellowish, more or less largely, often largely overspread with dark brown; lines dark brown, the inner slightly flexuous; discal ringlet subreniform; outer line straight to end of cell, strongly excurved to near margin above tornus, retreating below discal ringlet and reaching inner margin at middle. The brown shading fills up nearly all the space between the marks, but leaves a light edge within the inner line, beyond the outer, and before the discal ringlet. Hind wing with the base to inner line brown; a light space in which are three irregular discal spots partly or wholly fused to the outer line by dark shading; terminal area broadly dark; fringe interlined with pale. Expanse, 12 to 15 mm.

This species is common in the Northern Atlantic states, and I can only account for my failure to find any previous description of it, by its great similarity to *Blepharomastix stenialis* Guen., which may have caused it to be overlooked. It differs superficially from that species only in being smaller, although it is usually much darker shaded.

N. Ill. (A. Bolter); Hazelton, Pa., August 5, 1895 (W. G. Dietz); 4, Essex Co. Park, N. J., June 13, 1899 (W. D. Kearfott); 2, Greenwood Lake, N. J., June 10, 1900 (W. D. Kearfott); Delaware Co., Pa., July 1, 1900 (W. D. Kearfott); 21, Center Harbor, N. H., June 24, July 9, 1902 (H. G. Dyar); 2, Quebec and Ontario (A. W. Hanham); Maine (A. S. Packard); St. Louis, Mo., June 2, 1877 (C. V. Riley); 2, St. Louis, Mo., August 1 to 7, 1904 (H. A. McElhose); Eufala, Alabama (C. V. Riley); Texas (Boll); 3 Louisiana, Mo. (G. M. Dodge); Tryon, N. C., September 5 (W. F. Fiske).

Type no. 9492, U. S. Nat. Mus.

**Genus DIATHRAUSTA Lederer.**

*Diathrausta* Lederer, Wien. ent. Mon., 438, 1863.

*Diathrausta* Hampson, Trans. ent. soc. Lond., 205, 1897.

Palpi porrect, triangularly scaled, the third joint hidden by hair; maxillary palpi dilated with scales; frons rounded; antennæ annulated and ciliated; tibiae with the outer spurs two thirds the length of the inner. Fore wing with veins 3, 4, 5 from angle of cell; 7 well separated from 8, 9, 10. Hind wing with the cell about half the length of the wing; vein 4 absent; 6, 7 from upper angle (Hampson).

***Diathrausta reconditalis* Walker.**

*Hymenia reconditalis* Walker, Cat. Brit. Mus., xix, 943, 1859.

*Ædiodes minualis* Walker, Cat. Brit. Mus., xxxiv, 1297, 1865.

- *Diathrausta octomaculalis* Fernald, Ent. Amer., iii, 127, 1887.
- *Diathrausta pisualis* Fernald (not Walker), Smith list Lep. bor. Am., no. 3985, 1891.

*Diathrausta reconditalis* Hampson, Trans. ent. soc. Lond., 205, 1897.

*Diathrausta reconditalis* Fernald, Bull. 52, U. S. Nat. Mus., no. 4503, 1903.

Brownish black; inner line curved, ochereous; outer excurved over cell, sometimes broken, ochereous; three quadrate white dots in the position of reniform, orbicular and claviform; fringe white, black patched at middle of margin. Hind wing with round white discal spot; outer line ochereous above, white towards inner angle. Expanse 15 to 18 mm.

New York (Walker); Pa., N. Y., Ont., July 3, 1886 (Fernald).

No. 253 (coll. Prof. C. H. Fernald); Watchung Mts., N. J., June 19, 1899 (W. D. Kearfott); New Brighton, Pa., September 29, 1902 (H. D. Merrick); New Haven, Conn. (A. H. Verrill); Ft. Collins, Col., August 9, 1898 (C. P. Gillette); Chimney Gulch, Golden, Col., July 15, 1904 (E. J. Osler); Las Vegas Hot Springs, New Mexico (Schwarz & Barber); Santa Rita Mts., Pima Co., Arizona (O. C. Poling).

#### Genus *PILETOCERA* Lederer.

*Piletocera* Lederer, Wien. Ent. Mon., 431, 1863.

*Piletocera* Hampson, Trans. ent. soc. Lond., 209, 1897.

Palpi upturned, the second joint moderately fringed with scales in front and reaching vertex of head, the 3d obtuse; maxillary palpi extremely minute; frons rounded; antennæ of male (in our species) normal and ciliated; tibiæ with the outer spurs two thirds the length of inner. Fore wings with veins 3, 4, 5 from angle of cell; 7 well separated from 8, 9, 10. Hind wing narrow, the cell short; veins 3, 4, 5 from angle, 6, 7 from upper angle.

Hampson places under *Piletocera* eight other genera which differ in the modifications of the male antennæ. He recognizes them as subgenera. Section VIII, in which he puts our species, has no name and, on the usual supposition that these secondary sexual characters are of generic value, it appears that our species is without a genus. I am, however, retaining it in *Piletocera*. This genus has the antennæ of male with a slight tuft and distortion at middle, the fore wing with a small postmedial lobe on costa, the membrane distorted; legs naked.

#### *Piletocera bufalis* Guenée.

*Stenia bufalis* Guenée, Spec. Gen., viii, 245, 1854.

- *Botys stercoralis* Möschler, Verh. z.-b. Ges. Wien., xxxi, 419, 1881.

*Piletocera bufalis* Hampson, Trans. ent. soc. Lond., 214, 1897.

*Stenia bufalis* Druce, Biol. Cent.-Am., Lep. Het., ii, 561, pl. 101, f. 21, 1899.

♂ with a fovea in the cell, the wings slightly distorted. Dark gray-brown, lines blackish; inner line wavy, obscure; discal dot a squared ringlet; outer line dentate, excurved over cell, edged without with whitish. Hind wing lighter, the mesial line produced outward on central segment, faintly darker, edged without with pale; traces of a discal dot. Expanse, 14 to 20 mm.

Cayenne, French Guiana (Guenée); Paramaribo, Dutch Guiana (Möschler); Panama (Druce).

4 ♂, 3 ♀, Charlotte Harbor, Lake Worth and Miami, Fla. (Mrs. Slosson, in coll. Prof. C. H. Fernald); 10 ♀, Miami, Fla. (W. Schaus); 9 ♀, Cayenne, French Guiana (W. Schaus).

#### Genus STENIODES Snellen.

*Steniodes* Snellen, Tijds. voor. Ent., xviii, 244, 1875.

*Stenia* Hampson (in part), Trans. ent. soc. Lond., 206, 1897.

Palpi porrect, triangularly scaled, the third joint hidden by hair; maxillary palpi dilated at extremity; frons rounded; antennæ of male thickened and bearing a tuft of hair at one fourth from base; fore wing with vein 3 from before angle of cell; 4, 5 from angle; 7 straight and well separated from 8, 9, 10. Hind wing with the cell about half the length of the wing; vein 3 from before angle; 4, 5 approximated for a short distance; 6, 7 from upper angle.

#### *Steniodes gelliasalis* Walker.

*Botys gelliasalis* Walker, Cat. Brit. Mus., xix, 988, 1859.

*Steniodes lutealis* Snellen, Tijds. voor Ent., xviii, 245, 1875.

*Stenia gelliasalis* Hampson, Trans. ent. soc. Lond., 207, 1897.

Of the color and markings of *Piletocera bufalis* Guen., and easily confused therewith. The palpi are straight and porrect and white on the lower half, while in *bufalis* they are curved, though short, and are dark below. Wings squarer and more trigonate than in *bufalis*, the lines a little more delicate and less contrasted. Hind wing nearly uniformly dark, the marks obliterate. Expanse, 13 to 15 mm.

Rio Janeiro, Brazil (Walker); West Indies (Snellen).

1 ♀, Lake Worth, Florida (Mrs. Slosson); 1 ♀, Jamaica (W. Schaus); 1 ♀, Grenada, B. W. I. (W. Schaus); 1 ♀, Brownsville, Texas, Los Borregos, June 5, 1904 (H. S. Barber).

#### Subfamily SCOPARIINÆ.

Proboscis present; palpi porrect and hairy, the maxillary palpi dilated with long hairs. Fore wings with more or less developed tufts of raised scales in the cell; vein 7 from cell, 10 from cell. Hind wing with the median nervure non-pectinate.

#### Genus SCOPARIA Haworth.

*Scoparia* Haworth, Lep. Brit., 491, 1803.

*Eudorea* Curtis, Brit. Ent., vi, 170, 1825.

*Lissophanes* Warren, Ann. Mag. Nat. Hist., (6) viii, 67, 18.

*Scoparia* Hampson, Trans. ent. soc. Lond., 229, 1897.

Palpi porrect; maxillary palpi triangularly scaled; front flat; antennæ minutely ciliated; tibiae with the outer spurs about two thirds the length of the inner. Fore wing with vein 3 from before angle of cell, 4, 5, from angle, 7 well separated from 8, 9, to which 10 is approximated towards origin. Hind wing with 3 from before angle of cell, 4, 5 from angle or stalked, 6, 7 shortly stalked.

The larvæ are all unknown.

*Synopsis of Species.*

Outer line straight, at least not excurved mesially.

Dark gray ..... **rectilinea.**

Pale, almost white. .... **expallidalis.**

Outer line excurved over discal nervules.

Inner line arcuate.

Large species, expanse over 25 mm.

Subterminal line obsolete or as a limit to the lighter terminal area only.

♀ darkly shaded, marks obscured. .... **centuriella.**

♀ light gray, marks distinct. .... **normalis.**

Subterminal line defined, yellowish, sinuate. .... **delphusa.**

Small species, expanse less than 25 mm.

Wing dark brown-gray, lines pale, faint. .... **penumbralis.**

Markings relieved, lines in part black.

Wing with a broad contrasting pale median space.

Outer line nearer reniform than margin. .... **cinereomedia.**

Outer line nearer margin than reniform. .... **schwarzalis.**

Median space, if pale, not contrasted, general effect unicolorous.

Spots all short black streaks. .... **strigalis.**

Spots, at least in part, annular or cuspidiform.

Orbicular and reniform united by a longitudinal bar or ellipse. .... **lugubralis.**

Stigmata separate.

Larger; outer line sharply and widely outcurved for half its length. .... **tricoloralis.**

Smaller; outer line slightly and irregularly outcurved in the middle. .... **basalis.**

Inner line straight, strongly oblique. .... **torniplagalis.**

***Scoparia rectilinea* Zeller.**

*Scoparia rectilinea* Zeller, Verh. zool.-bot. Ges. Wien., xxiv, 427, 1874.

*Scoparia refugalis* Hulst, Trans. Am. ent. soc., xiii, 148, 1886.

*Scoparia refugalis* Fernald, Smith's list Lep. Bor. Am., no. 4130, 1891.

*Scoparia rectilinea* Fernald, Smith's list Lep. Bor. Am., no. 4131, 1891.

*Scoparia rectilinea* Hampson, Trans. ent. soc. Lond., 234, 1897.

*Scoparia rectilinea* Dyar, Proc. U. S. nat. mus., xxvii, 918, 1904.

Dark gray ; inner line curved, narrowly black with pale inner edge, fused to the linear small black claviform ; orbicular a small obscure ellipse ; reniform two black cusps joined by a bar ; outer line black, straight, bent inward a little below costa ; terminal space black, cut by a diffused gray subterminal line, bent in the middle ; a row of terminal black dots. Hind wings gray with faint submarginal pale line. Expanse, 17-20 mm.

Vancouver Is. (Zeller) ; California (Hulst).

1, labelled "*Scoparia refugalis* Hulst, homotype" (Coll. Prof. C. H. Fernald) ; 175, Kaslo, B. C., July, August (H. G. Dyar) ; 1, Shawnigan Lake, B. C., August 29 (H. G. Dyar) ; 1, Los Angeles, Cal. (D. W. Coquillett) ; Wellington, B. C. (G. W. Taylor) ; 27, San Louis Obispo, Cal. (A. H. Vatchell, in coll. W. D. Kearfott).

#### ***Scoparia expallidalis*, new species.**

Fore wings very pale gray, nearly white, thin and delicate ; inner line faint curved, pale brown, attached to the small, black, linear claviform ; orbicular a brown ringlet ; reniform of two cusps with a bar below ; outer line narrow, dark and straight, without excurve, separated narrowly from a brown shade that runs to margin, cut only by the white subterminal line, which is incurved at middle ; fringe maculate. Hind wings subpellucid white, gray tinted, relieving a white submarginal band faintly. Expanse, 20 mm.

6, Verdi, Nevada, June 10, 20, 30 (A. H. Vatchell, in coll. W. D. Kearfott).

Type no. 9633, U. S. Nat. Mus.

#### ***Scoparia centuriella* Schifferrniller.**

*Tinea centuriella* Schifferrniller, Syst. Verz. Wien., 319, 1776.

• *Eudorea borealis* Lefebvre, Ann. ent. soc. Fr., 400, 1836.

• *Eudorea muneris* Zetterstedt, Ins. Lapl., 971, 1840.

• *Phycis quadratella* Zetterstedt, Ins. Lapl., 997, 1840.

• *Hyphen cecalis* Walker, Cat. Brit. Mus., xvi, 36, 1858.

• *Scopula caliginosalis* Walker, Cat. Brit. Mus., xxxiv, 1460, 1865.

*Scoparia centuriella* Grote, New ch. list Am. moths, 52, 1882.

• *Scoparia ninguinalis* Hulst, Trans. Am. ent. soc., xiii, 147, 1886.

*Scoparia centuriella* Fernald, Smith's list Lep. Bor. Am., no. 4127, 1891.

• *Scoparia albisinuatella* Fernald (not Packard), Smith's list Lep. Bor. Am., no. 4129½, 1891.

*Scoparia centuriella* Hampson, Trans. ent. soc. Lond., 234, 1897.

• *Scoparia frigidella* Hampson (not Packard), Trans. ent. soc. Lond., 234, 1897.

*Scoparia albisinuatella* Hampson (not Packard), Trans. ent. soc. Lond., 234, 1897.

*Scoparia centuriella* Staudinger & Rebel, Cat. Lep. Eur., ii, no. 946, 1901.

*Scoparia centuriella* Dyar, Proc. Wash. Acad. Sci., ii, 498, 1900.

*Scoparia centuriella* Fernald, Bull. 52, U. S. Nat. Mus., no. 4510, 1903.



*Scoparia centuriella* Dyar, Proc. U. S. Nat. Mus., xxvii, 918, 1904.

♂. Light ashen gray to dark blackish gray, usually pale; lines dark, diffused, the outer excurved over cell, the inner dark, often indented on the costa, the outer pale edged; a black linear claviform; narrowly elliptical or linear orbicular, quadrate suffused, reniform, hour glass shaped or of two opposed cusps; a dark shade subapically and above tornus. Hind wing sordid, dark along the margin. Expanse, 29-32 mm.

♀. Darker, the marks obscured or nearly entirely obsolete, the lines and reniform longest persistent. Expanse, 29-33 mm.

Northern Europe to the Arctic regions; Nova Scotia (Walker); Arizona (Hulst).

3 ♂, 1 ♀, Orono, Maine, Amherst, Mass (C. H. Fernald); 1 ♀, Arizona, labelled "*Scoparia ninguidalis* Hulst, type" (Coll. Prof. C. H. Fernald); 3, Montana (through C. V. Riley); 12, Popof Is., Alaska, July, 1899 (Harriman expedition); 26, Kaslo, B. C., June, July, August (H. G. Dyar); 1, New York (C. V. Riley); 1, Plattsburgh, N. Y., June 21, 1888 (H. G. Dyar); 6, Southern Utah, July, 1900 (O. C. Poling); 1, Glenwood Springs, Col., July (W. Barnes); 1, Pikes Peak, Col., above timber, July 21, 1901 (Dyar & Caudell).

The Western form is larger and somewhat more contrasted in color and may be distinguished as variety *ninguidalis* Hulst.

#### *Scoparia normalis* Dyar.

*Scoparia normalis* Dyar, Ent. news, xv, 71, 1904.

Pale gray; a black shade at base of fore wings; inner line dark, slightly bent at middle, thickened on costal two thirds by a broad black bar which absorbs orbicular and claviform; reniform fused to costa by a black shade, formed of two superposed confluent ellipses, partly filled with black; outer line pale, narrowly black shaded within, bent outward slightly beyond reniform; terminal space irregularly black shaded, the shades succeeding the outer line on costa and inner margin and on center of outer margin; a row of black terminal points; fringe dark gray with white dashes at the ends of the veins. Hind wings soiled whitish, darkest along outer margin. Expanse, 26 mm.

One ♀, Beulah, New Mexico, 8,000 feet (T. D. A. Cockerell). It resembles the ♂ of *centuriella* Schiff., but is very different from the ♀ of that species.

Type no. 7654, U. S. Nat. Mus.

#### *Scoparia delphusa* Druce.

*Scoparia delphusa* Druce, Biol. Cent.-Am., Lep. Het., ii, 279, pl. lxiv, f. 1, 1895.

*Scoparia delphusa* Hampson, Trans. ent. soc. Lond., 234, 1897.

*Scoparia delphusa* Fernald, Bull. 52, U. S. Nat. Mus., no. 4509, 1903.

"Primaries pale greyish-brown, crossed by two waved white lines edged with black on the inner side—the first near the base, the second submarginal—a dark brown spot partly crossing the wing from the costal margin towards the base, the fringe grey and brown; secondaries semihyaline greyish-white, slightly shaded with brown near the apex, the fringe greyish-white; head, antennæ, palpi and thorax pale brown, the abdomen grey. Expanse 1 inch." (Druce.)

Amecameca in Morelos, Mexico City, Mex.; Quiche Mts., Totomcapam, Guatemala (Druce). Sir George Hampson adds "Western States," but I do not otherwise know the species from our territory, nor have I seen a specimen.

**Scoparia penumbralis, new species.**

Smoky brownish gray; lines whitish, the inner wavy, the outer slightly excurved opposite the cell, both edged toward middle by dark narrow shades; traces of reniform discal dot apparently in two cusps, but much obscured; terminal space slightly paler; subterminal line lost. A dusky colored and very uniform species. Expanse 12 mm.

4 from Prof. Fernald labelled 318 and 7, 25 and Ent. Soc. Ont., 146 and 17, Dr. Dietz, Hazleton, Pa., June 8, 1895; 2, Montclair, N. J., June 13, 1899 (W. D. Kearfott); 1, Essex Co. Park, N. J., June 3, 1899 (W. D. Kearfott); 3, Center Harbor, N. H., June 22, 1902 (H. G. Dyar); New Brighton, Pa., June 17, 1902 (H. D. Merrick).

Type no. 9634, U. S. Nat. Mus.

**Scoparia cinereomedia Dyar.**

*Scoparia cinereomedia* Dyar, Ent. news, xv, 72, 1904.

Pale gray; basal space heavily, but not continuously shaded in black as far as the inner line; center of wing clear gray, the outwardly placed reniform composed of two superposed ellipses, clouded and fused to costa by black; outer line narrow, pale, crenulate, bent opposite reniform but not forming an arc, black edged within. Terminal space shaded in black, leaving a pale space below apex and above anal angle; terminal black spots diffuse; fringe white with a dark basal line. Hind wings grayish, subpellucid. Expanse 14.5 mm.

Two specimens, New Brighton, Pa. (H. D. Merrick.)

Type no. 7657, U. S. Nat. Mus.

**Scoparia schwarzalisi, new species.**

Fore wing light gray, the extreme base dark; a broad dark shade beyond the pale sinuate inner line, enclosing the quadrate black reniform and oblique linear orbicular; a broad space of the pale ground to outer line. Reniform of two opposed black cusps; outer line dark, narrowly excurved at end of cell, dentate, closely fol-

lowed by a broad dark shade; submarginal light space excised at middle by a black mark resting on margin. Hind wings pale gray. Expanse 16 mm.

One ♂, Santa Rita Mts., Ariz., May 30, 1898 (E. A. Schwarz).  
Type no. 9636, U. S. Nat. Mus.

***Scoparia strigalis*, new species.**

Light gray, lines very obscure, darker; outer line irregularly excurved over cell; a black basal dash to first line; a long black dash for claviform; a short black dash for orbicular and a longer one for reniform; two slender dashes in terminal area opposite the reniform dash; a small dark apical shade. Hind wings silky gray. Expanse 13-17 mm.

Grimsby, Ontario (J. Pettit); Delaware Co., Pa., August 17 (P. Laurent); Plummer's Is., Md., July 1, 1903 (A. Busck).

Type no. 9635, U. S. Nat. Mus.

***Scoparia lugubralis* Walker.**

*Scoparia lugubralis* Walker, Cat. Brit. Mus., xxxiv, 1498, 1865.

*Scoparia nominatalis* Hulst, Trans. Am. ent. soc., xiii, 148, 1886.

*Scoparia nominatalis* Hampson, Trans. ent. soc. Lond., 233, 1897.

*Scoparia lugubralis* Hampson, Trans. ent. soc. Lond., 233, 1897.

*Scoparia lugubralis* Fernald, Bull. 52, U. S. Nat. Mus., no. 4504, 1903.

*Scoparia nominatalis* Fernald, Bull. 52, U. S. Nat. Mus., no. 4505, 1903.

*Scoparia nominatella* Dyar, Proc. U. S. Nat. Mus., xxvii, 918, 1904.

Ashen gray to bluish gray, lines whitish; inner line arcuate, edged without with black, often strongly so, even forming a broad black band on costal half; claviform faint, clouded or absent; orbicular a dash, from which a line extends to reniform, or two lines, enclosing an elliptical pale space that looks like an orbicular; reniform of two opposed cusps; outer line pale, rather narrowly excurved over cell, followed by a dark shade, divided centrally; submarginal line obsolete. Hind wings subpellucid pale grayish. Expanse 17-21 mm.

St. Martin's Falls, Hudson Bay (Walker); Vancouver Is., B. C. (Hulst).

Los Angeles, Cal. (D. W. Coquillett); Arizona (Morrison); Seattle, Wash., June 7, 1902 (T. Kincaid); Glenwood Springs, Col., July 24-30 (Dr. Barnes); Pullman, Wash., July 26, 1898 (C. V. Piper); 6, Kaslo, B. C., August (J. W. Cockle, H. G. Dyar); Denver, Col. (E. J. Oslar); Platte Canyon, Col., August 26, 1904 (E. J. Oslar); Wellington, B. C. (G. W. Taylor); White Mts., N. H. (coll. Prof. C. H. Fernald).

A figure of Walker's type has been made for me by Mr. Horace Knight through the kindness of Sir G. F. Hampson. It has a faded yellowish look, but otherwise is a specimen of *nominatalis* with little

development of the dark shades. The ordinary spots are joined by a slender line on subcostal and median veins.

**Scoparia tricoloralis Dyar.**

*Scoparia tricoloralis* Dyar, Ent. news, xv, 72, 1904.

*Scoparia tricoloralis* Dyar, Proc. U. S. Nat. Mus., xxvii, 818, 1904.

Light gray, shaded with black; a black patch at base of fore wing on costa; inner line pale, slightly oblique, bent a little at the middle, followed on costal two-thirds by a heavy black band that absorbs the orbicular and claviform; reniform small, of two superposed black spots, followed by a large, contrasted, brown cloud; outer line narrow, white, narrowly dark-edged within, roundedly, evenly and strongly bent outward beyond the reniform; terminal space heavily black shaded, cut outwardly centrally by a diffuse pale arc, representing the subterminal line. Fringe pale, black checkered at base. Hind wings blackish shaded, subpellucid along internal margin. Expanse, 19-21 mm.

4, Wellington, B. C. (Theo. Bryant); Kaslo, B. C. (Caudell, Currie and Cockle); 4, Seattle, Wash. (O. B. Johnson); 1, Arrowhead Lake, B. C. (Dr. Barnes).

Type no. 7656, U. S. Nat. Mus.

*Ab. a.* The ground color is less darkened, the whitish shades to the outer line scarcely relieved; red-brown shade absent except a little in reniform.

Denver, Col., July 29, 1904 (E. J. Oslar).

*Ab. b.* Median space solidly filled in dark, black basally, red-brown outwardly.

Denver, Col., August 6, 1904 (E. J. Oslar).

**Scoparia basalis Walker.**

*Scoparia basalis* Walker, Cat. Brit. Mus., xxxiv, 1497, 1865.

\* *Scoparia biplagalis* Walker, Cat. Brit. Mus., xxxiv, 1499, 1865.

\* *Scoparia libella* Grote, Bull. U. S. Geol. Surv., iv, 675, 1878.

*Scoparia libella* Grote, New ch. list No. Am. moths, 52, 1882.

*Scoparia libella* Fernald, Smith's list Lep. bor. Am., no. 4128, 1891.

*Scoparia biplagalis* Hampson, Trans. ent. soc. Lond., 234, 1897.

*Scoparia basalis* Hampson, Trans. ent. soc. Lond., 234, 1897.

*Scoparia basalis* Fernald, Bull. 52, U. S. Nat. Mus., no. 4507, 1903.

\* *Scoparia fernaldalis* Dyar, Ent. news, xv, 72, 1904.

*Scoparia fernaldalis* Dyar, Proc. U. S. Nat. Mus., xxvii, 818, 1904.

Light gray; inner line pale, gently arcuate, edged without with blackish, to which the claviform and orbicular are attached, the whole forming an apparent dark band on upper half, vacuolated in pale yellowish; reniform distant, hour-glass-shaped, filled with pale yellowish, or broken into two cusps, the yellowish often evanescent; outer line pale, gently and rather narrowly excurved over cell; terminal space dark filled, faintly cut by the pale, diffuse subterminal line, tending to become a dark triangle on center of margin. Hind wing pale grayish. Expanse, 11-16 mm.

"North America" (Walker); St. Martin's Falls, Hudson Bay (Walker); Maine, Massachusetts, New York (Grote).

One from Prof. C. H. Fernald labelled "*Scoparia libella* Grote, homotype"; Plummer's Is., Md., September, 1903 (A. Busck); New Brighton, Pa., June 9, 22, 1900 (H. D. Merrick); King and Bartlett Lk., Maine (P. Laurent); North Carolina (Morrison); Center Harbor, N. H., June 20, 1902 (H. G. Dyar); Ontario, Canada (Dr. Fletcher); Virginia, September 16, 1880 (T. Pergande); D. C., September 27, 1885 (U. S. Dept. Agriculture); Iowa (C. P. Gillette); New York (Riley coll.); Rhinebeck, N. Y., September 4, 1887, July 1888 (H. G. Dyar); North Mt., Pa. (P. Laurent); St. Louis, Mo., August 20, 1904 (H. McElhose); Archer, Fla., December 3, 1882 (A. Koebele); Pittsburgh, Pa., June 11, 1905 (H. Engel).

*Ab. a. palloralis*, new variety. Generally larger, paler, though not contrastingly so; the markings brown rather than black.

Arizona (Morrison); Argus Mts., Ariz., May, 1891 (A. Koebele); Wilgus, Cochise Co., Ariz. (Dr. Barnes); Beulah, New Mexico, 8,000 ft., August (T. D. A. Cockerell); Dripping Spring, N. Mex. (T. D. A. Cockerell); Platte Canyon, Colorado (E. J. Osler); Pinal Mts., Ariz., July, 1900 (R. E. Kunzé in coll. W. D. Kearfott).

Type no. 9637, U. S. Nat. Mus.

*Ab. b. fernaldalis* Dyar. Rather larger, distinctly darker, the ground color blackish gray, on which the markings are not strongly relieved.

194, Kaslo, B. C., June, July, August (Dyar, Currie, Caudell, Cockle); Shawnigan Lk., B. C., August 30 (H. G. Dyar); Wellington, B. C. (T. Bryant).

Type no. 7655, U. S. Nat. Mus.

*Ab. c. obispalis*, new variety. Small, uniformly gray, the spots blackish, diffused shades without sharp marks, the outer line nearly absent.

4, San Louis Obispo, Cal., March (A. H. Vatchell, from W. D. Kearfott).

Type no. 9638, U. S. Nat. Mus.

#### ***Scoparia torniplagalis* Dyar.**

*Scoparia torniplagalis* Dyar, Journ. N. Y. ent. soc., xii, 105, 1904.

Wings narrow; light gray, basal space slightly ochreous tinted, a black subbasal point, incompletely connected to base; inner line strongly oblique, whitish, slightly



notched on median vein, black shaded without; a diffuse brown shade spreads from the black color to the disk. Reniform marked by a fine, irregular black X-mark. Outer line narrowly excurved over cell, else nearly straight, whitish, narrowly black edged within. A black shade at tornus and small dot opposite center of outer margin. Hind wing pale whitish, smoky on margin. Expanse, 17 mm.

2, Seattle, Washington (O. B. Johnson); Rico, Colorado (E. J. Osler from W. D. Kearfott).

Type no. 7886, U. S. Nat. Mus.

***Scoparia atropicta* Hampson.**

*Scoparia atropicta* Hampson, Trans. ent. soc. Lond., 233, 1897.

*Scoparia atropicta* Fernald, Bull. 52, U. S. Nat. Mus., no. 4506, 1903.

Sir George Hampson has kindly sent me a figure of this species, which shows a form unlike anything known heretofore from North America. He says the label is "Am. Sept. 5, iv, Mus. Z. Mschl 5, 79." but adds that the locality is probably a mistake and the species is the same as *S. exhibitilis* Walker from Australia. I believe this to be correct and, with this explanation, drop the name from the American list.

**DESCRIPTIONS OF FOUR NEW SPECIES OF  
NORTH AMERICAN MOTHS.**

BY HARRISON G. DYAR, PH.D.,

WASHINGTON, D. C.

Family PYRALIDÆ.

Genus **SALEBRIA** Zeller.

***Salebria engeli*, new species.**

Belongs to the group *pumilella* Rag., *annulosella* Rag., *nubiferella* Rag., *turpidella* Rag., *tenebrosella* Hulst, and resembles these forms, except that the whole wing is darkly obscured with black, on the basal half so much so as to hide the lines, while the white mark on the inner margin is large, pure white and contrasted.

One ♂, Oak Station, Pa., July 10, 1904 (sent by Mr. H. Engel).

Type no. 9787, U. S. National Museum.

Genus **IMMYRLA**, new.

Fore wings with 11 veins, hind wing with 8 veins; ♂ antennæ with a large tuft at base; palpi large, upturned, hollowed to receive the pencil-tufted maxillary palpi; fore wing with subbasal scale ridge.

Differs from *Salebria* in the presence of the scale ridge.

***Immyrila nigrovittella*, new species.**

Uniform dark gray, the median space a shade lighter; scale ridge narrow, deep black, slightly oblique and not quite attaining costa; inner line just beyond, faint, parallel to scale ridge, scarcely waved; discal dots confluent in a bar, dark gray; outer dark shading crosses the outer line, which is pale, faintly dark-edged, gently bowed in the middle. Expanse, 20 mm.

One ♂, Pittsburgh, Pa., May 29, 1905 (Henry Engel).

Type no. 9786, U. S. National Museum.

**Genus EURYTHMIA Ragonot.*****Eurythmia yavapaëlla*, new species.**

Dark gray, the abdomen ochereous, tinted at tip. Fore wing gray, a little darker along costa and in outer field; lines pale, rather broad, weakly defined by dark scales, slightly flexuous; discal dots black, separate, distinct in one specimen, partly absent in the other. Hind wing subpellucid whitish, gray shaded on costa and apex. Expanse, 16 mm.

Two ♂, Yavapai Co., Arizona (through Mr. W. D. Kearfott). Apparently near *coloradella* Hulst, but larger and more distinctly marked.

Type no. 9858, U. S. National Museum.

**Family TORTRICIDÆ.****Genus EUCOSMA Hübner.*****Eucosma picicolana*, new species.**

Head and front of collar rusty ochereous; thorax and abdomen light gray. Fore wing light gray, mottled-strigose in darker; base and anterior line, broken mesial line, outer band from costa toward tornus darker gray, angularly edged, indistinct; a neat round patch before tornus on inner margin of brownish black, nearly solid; a similarly colored band from apex, curving again to outer margin below middle, these marks distinct. Fringe dark, as also extreme margin, white at angle. Hind wing dark gray, indistinctly darker strigose; fringe white. Below, fore wings dark gray with costa whitish; hind wings whitish, with sparse strigose blotches, thicker at margin. Expanse, 33 mm.

One ♀, bred from a mass of pitch on the trunk of *Abies lasiocarpa* at Paradise Valley, Mt. Rainier, Washington, by Mr. H. E. Burke, of the Bureau of Entomology, Department of Agriculture.

Type no. 9801, U. S. National Museum.

In the absence of a ♂, the species may not be correctly referred generically.

JOURNAL  
OF THE  
**New York Entomological Society.**

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EDITED BY HARRISON G. DYAR.

Publishes articles relating to any class of the subkingdom Arthropoda, subject to the acceptance of the Publication Committee. Original communications in this field are solicited.

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BOOK NOTICES.

*Twentieth Report of the State Entomologist* on injurious and other insects of the State of New York, 1904, New York State Museum, Bulletin 97, Entomology 24. By EPHRAIM PORTER FELT, State Entomologist, Albany, New York, State Education Department, 1905.

Dr. Felt's report covers 206 pages with 19 plates and an index. A general account occupies 84 pages; then 58 pages are devoted to studies in Culicidæ, followed by an account of the Jassidæ of New York State by Herbert Osborn, a list of the Hemiptera taken in the Adirondack Mts. by E. P. VanDuzee and of the Lepidoptera taken at Keene Valley by G. F. Comstock. The plates all refer to the article on Culicidæ. The wing scales are given of several exotic species and figures from photographs of the genitalia of 32 species, most of which are here figured for the first time. Only a few of the species are native to New York and are mainly widely exotic. We find the figures most valuable and interesting, but cannot help feeling that the place of publication is a mistake. One of the regular entomological journals would have been more appropriate.

Dr. Felt describes a new species, *Culiselsa auroides* (p. 449) both adult and larva, which he finds allied to *aurifer* Coq. He has kindly loaned us his slides of this larva, which appears to us rather allied to *trivittatus* Coq., as it falls next thereto in our tables. He proposes

the name *subcantans*\* (p. 474) for the American species heretofore known as *cantans* Meig. The genitalia of our form are found to differ from those of the European species, specimens of which Dr. Felt has received from Dr. F. Meinert. This agrees with what we had anticipated (Journ. N. Y. ent. soc., xiii, 51, 1905) and we congratulate Dr. Felt on being able to demonstrate it. We notice some discrepancies between the figures of the genitalia of *fitchii* and *abfitchii* and our own figures of these species, recently published in this Journal. These concern the filament of the harpe, a very delicate structure, the shape of which may be apparently altered by differences in the excellence of the preparation. We think our figure of *fitchii* is the better, while Dr. Felt has evidently secured a better illustration of *abfitchii* than we did.

*Notes on Some Jamaican Culicidæ.* By M. GRABHAM, M.A., M.B.,  
Government Medical Service, Jamaica, West Indies. Canadian  
Entomologist, xxxvii, 401-411, 1905.

We desire to notice Dr. Grabham's paper, principally because he has illustrated the very parts of the mosquito larvæ which we want to know about, and we are able to place nearly all the species he describes at once in our tables. But the larvæ do not agree with those that we have had (and in some cases described) under these names. We believe that in no case is there an agreement. Dr. Grabham describes *Uranotenia lowii* Theob., and *U. socialis* Theob., but we can not make either agree with Miss Mitchell's detailed separation of these forms as they occur in New Orleans. *Melanoconion atratus* Theob. does not agree; our larva has a pilose body and shorter air tube. *Culex confirmatus* Arrib. is widely different from the continental form; our larva is glabrous and the pecten of the air tube runs only half way. *Culex janitor* Theob., is still more different; we have a larva with a long air tube and antennal tuft at the outer fourth arising from a set-off as in *secutor*. *Culex microsquamosus* Theob. is a new species and the larva new to us. There can be no argument about this one. *Janthinosoma jonstonii* Grabham is described without larva. Now all this discrepancy means either that the larvæ are variable, in which case we can not separate one Culicid larva from another, or that somebody's determinations are faulty. Dr. Grabham's adults were, we presume,

\* But the *stimulans* of Walker, heretofore referred to the synonymy of *cantans*, has yet to be accounted for.

determined by Mr. Theobald; ours were named by Mr. Coquillett. We invite these gentlemen to get together and compare notes.

*Report and Yearbook* of the Experiment Station Committee of the Hawaiian Sugar Planters' Association for the year ending September 30, 1905. Honolulu, 1905.

This report appears to be from a committee of the experiment station in the planters' association, though no author is mentioned. A list of all the officers is given on the first page. There are a number of separately paged papers, of which only the entomological ones interest us here. These are Bulletin no. 1 — Leaf-hoppers and Their Natural Enemies, divided into parts:

Part I — Dryinidæ, by R. C. L. Perkins.

Part II — Epipyropidæ, by R. C. L. Perkins.

Part III — Stylopidae, by R. C. L. Perkins.

Part IV — Pipunculidæ, by R. C. L. Perkins.

Part V — Forficulidæ, Syrphidæ and Hemerobiidæ, by F. W. Terry.

Part VI — Mymaridæ, Platygasteridæ; by R. C. L. Perkins.

Also two circulars by Perkins on the history and occurrence of the sugar cane leaf-hopper (*Perkinsiella saccharicida* Kirkaldy) and some diseases of cane especially considered in relation to the leaf-hopper pest and to the stripping of cane.

The part on Lepidoptera treats of the family Epipyropidæ, which Mr. Perkins proposes as new, but which we had already used (Bull. 52, U. S. Nat. Mus., 359, 1903). Three new genera and seven species are described (from Australia), and many new and highly interesting facts about the life histories and habits are recorded. Perhaps the most peculiar are that some of the species are parthenogenetic, while the newly hatched larva has a special structure and actively seeks its prey, the eggs being laid on plants. The larvæ seem to be true parasites, causing the death of the host. Mr. Perkins gives a synoptic table of the genera, but does not include the genus *Epipyrops* of Westwood, which we would do as follows. We would add a new genus, *Epipomponia*, proposed for our species *naiwai* (Proc. ent. soc. Wash., vi, 19, 1904) described from Japan. In the bibliography Mr. Perkins could have added two notes published in the Proc. ent. soc. Wash., v, 180, 1903, and vi, 19, 1904.



Table of genera of *Epipyropidæ*.

1. Hind wings with eight veins ; 7 and 8 of fore wings separate.....2.  
Hind wings with less than eight veins ; 7 and 8 of fore wings approximated or united .....3.
2. Hind wings with vein 8 free.....**Epipyrops** Westwood.  
Hind wings with vein 8 joined to the subcostal by a bar .....**Epipomponia** Dyar.
3. Vein 7 of hind wings apparently free to base ; fore wings with 12 veins.  
**Palæopsyche** Perkins.  
Hind wings with normal venation ; fore wings with less than 12 veins .....4.
4. Fore wings with veins 7 and 8 long-stalked or coincident...**Agamopsyche** Perkins.  
Fore wings with veins 7 and 8 connate.....**Heteropsyche** Perkins.

## PROCEEDINGS OF THE NEW YORK ENTOMOLOGICAL SOCIETY.

MEETING OF MAY 16, 1905.

Held at the American Museum of Natural History.

President C. H. Roberts presided with eleven members in attendance.

The librarian reported the receipt of the following exchanges :

Verh. d. k. k. Zool. Bot. Gesell. Wien., Vols. LIV, No. 10; LV, Nos. 1 and 2.

Proc. Am. Acad. Arts and Sci., Vol. XL, Nos. 12, 13 and 14.

Proc. Am. Philos. Soc., Vol. XLIII, No. 178.

Tijdsch. v. Entom., 1904, Nos. 2, 3 and 4.

Sci. Bull., Vol. I, Nos. 5 and 6 of Mus. Brooklyn Institute.

Cold Springs Harbor Laboratory Monographs, III, 1905.

Zeitsch. f. Wissenschaft. Insekten biol., Bd. 1, Nos. 3 and 4.

Jahresbericht des Wien. Ent. Vereins., 1904.

Canad. Entom., XXXVII, Nos. 4 and 5.

Wien. Ent. Zeit., XXIV, Nos. 3 and 4.

Deutsche Entom. Zeitschrift, 1905, No. 1.

Descript. du Matériel d. petite installation scientifique, 1 part, 1903, by Chas.

Janet.

Observations sur les Gûpes, by Chas. Janet.

Observations sur les Fourmis, by Chas. Janet.

Report on Mosquitoes, by John B. Smith, 1904.

Hayden's Geological Survey, Report for 1871 and 1872.

Proc. U. S. Nat. Museum, XXVIII, No. 1398.

On motion of Mr. Joutel the Society voted to set aside the sum of \$25.00 which the publication committee and librarian were authorized to draw upon for the purchase of books for the library.

(To be continued.)

# THE NEW YORK ENTOMOLOGICAL SOCIETY.

Organized June 29, 1892.—Incorporated June 7, 1893.

The meetings of the Society are held on the first and third Tuesday of each month (except June, July, August and September) at 8 P. M., in the AMERICAN MUSEUM OF NATURAL HISTORY, 77th Street and Eighth Ave.

Annual dues for Active Members, \$3.00.

Members of the Society will please remit their annual dues, payable in January, to the treasurer.

## Officers for the Year 1906.

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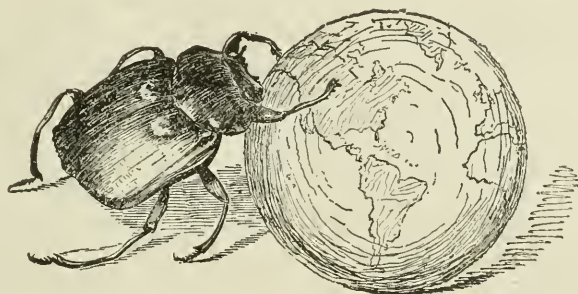
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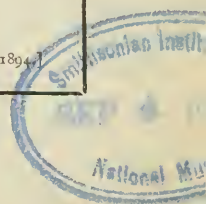
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## JOURNAL

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Vol. XIV.

SEPTEMBER, 1906.

No. 3

Class I, HEXAPODA.

Order II, COLEOPTERA.

THE NORTH AMERICAN SPECIES OF THE  
GENUS NOTARIS GERM.

By F. H. CHITTENDEN, SC.D.,

WASHINGTON, D. C.

*Notaris*, Magazin der Entomologie, vol. 11, p. 340, 1817.

In 1876, in The Rhynchophora of America North of Mexico (p. 163), LeConte placed two *Eirrhinines*, *morio* Mann. and *puncticollis* Lec., in the genus *Erycus* Tourn.,\* and they are thus classified in our catalogues and collections, notwithstanding the fact that European systematists have relegated *Erycus* to a subgenus under *Notaris* Germar, which latter was proposed in 1817.

The genus *Notaris* was defined by Stephens in 1831,† and more recently characterized by Faust.‡ Briefly, it contains those species of *Eirrhinini* in which the prosternum is deeply emarginate on the anterior margin, the femora are moderately clavate and simple, and the postocular lobes are distinct and wide, the posterior tibiæ being feebly mucronate. The apical sutures of the second, third and fourth abdominal segments are very prominent. In the male the first and second are shallowly but widely concave and the apex of the fifth feebly. LeConte's characterization of *Erycus*, with two very small spines or spurs on the posterior tibiæ, does not hold for a species which will presently be described.

\* Ann. Soc. Ent. de Belgique, vol. XVII, p. 92, 1874.

† Ills. Brit. Ent., Mandibulata, vol. IV, p. 81, 1831.

‡ Bull. Soc. Impériale Naturalistes Moscou, 1882, pp. 136-143.

## SYNOPSIS OF SPECIES.

Subglabrous, shining, thorax sparsely punctate; elytral striæ moderately shallow, with small, closely-set punctures, N. W. .... **æthiops** Fab.

Distinctly minutely pubescent; thorax densely coarsely punctate.

Rostrum coarsely punctate, subopaque; antennæ inserted in apical fourth, club as long as preceding four joints, last funicular joint transverse; elytral striæ coarsely deeply punctate, E. U. S. .... **puncticollis** Lec.

Rostrum finely, more sparsely punctate, shining; antennæ inserted near middle, club shorter than preceding four joints, last funicular joint as long as wide; elytral striæ fine, Wyo., Col. .... **wyomingensis** n. sp.

**Notaris æthiops Fabricius.**

*Curculio æthiops* Fabricius, Entomologia Systematica, vol. 1, pt. 2, p. 495, 1792.

*Eriirhinus morio* Mannerheim, Bul. Soc. Mosc., 1853, 11, 240.

*Erycus morio* LeConte, Proc. Am. Phil. Soc., 1876, p. 163.

*Eriirhinus æthiops* Faust, Bul. Soc. Mosc., 1882, pp. 164-167.\*

Easily distinguished from our other species by the characters of the table.

*Length.* — 6.0 mm.; width, 2.5 mm.

*Habitat.* — Sweden, Germany, boreal Europe and Siberia; Kadjak, Kenai, Wrangel, Alaska; Vancouver, Manitoba, Great Slave Lake, Canada (Hamilton).† In the National collection there are specimens from the following localities: Como, S. Wyo., alt. 8,000 ft.; Whitefish, L. S., Bear Paw Mt., Mon., and Leadville, Colo. (Hubbard & Schwarz). Evidently a truly circumpolar form.

**Notaris puncticollis Lec**

*Erycus puncticollis* LeConte, Rhynch. N. A., Proc. Am. Phil. Soc., vol. XV, p. 163, 1876.

In describing the pubescence of the elytra LeConte mentions "a more conspicuous sutural transverse spot behind the middle." In many specimens this feature is not at all conspicuous, partly owing to easy abrasion. Where present these spots extend across the second and third interval. The fifth abdominal segment is much more finely and densely punctate than the others, and is less reflexed at apex.

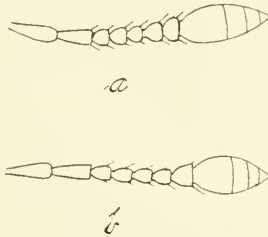
*Length.* — 4.8-6.5 mm.; width, 2.3-3.0 mm.

*Habitat.* — "Middle and Western States and Lake Superior" (LeConte); New York and vicinity, April 17-26; October 21 (Juelich & Roberts); Buffalo, N. Y., June 15; Ithaca, N. Y., April 25; Chicago, Ill. (Chittenden); Whitefish Point, L. S.; Minnesota; Wisconsin; Detroit, Port Huron and Backwing, Mich.; Whitefish,

\* The European literature is quite extensive and is not quoted at length.

† Tr. Am. Ent. Soc., 1894, p. 34.

L. S. (Hubbard & Schwarz); Wayne County, Ohio (Webster); Columbus, Ohio (Sanders).



Antennal characters of (a) *Notaris puncticollis*; (b) *N. wyomingensis*.

***Notaris wyomingensis*, new species.**

Form similar to *puncticollis* Lec., but proportionately more slender; black, antennae, tarsi and tibiae rufo-piceous. Rostrum somewhat finely and sparsely punctate, not carinate, surface shining. Antennae of ♀ inserted near middle of rostrum, of ♂ two-fifths from apex. Last funicular joint subtriangular, considerably larger than the preceding, as long as wide; club wide, not as long as preceding four joints. Thorax a little wider than long; sides rather strongly arcuate; surface coarsely densely, subrugosely punctate, sparsely covered with scale-like yellowish setae, directed transversely, forming a dorsolateral fascia each side and leaving a median smooth line extending from apex about four-fifths to base. Elytra (♀) one-third or less wider than thorax; humeri rounded; striae shallow, intervals densely punctate, sparsely pubescent, consisting of very short scale-like setae, third interval flat or feebly elevated, bearing a small tuft of prostrate whitish hairs behind the middle. Lower surface moderately coarsely, densely and nearly uniformly punctate, the punctures growing a little finer but not denser apically. The apex of the fifth abdominal segment somewhat strongly reflexed. Posterior tibiae without short terminal spurs.

*Length.* — 6.5–7.5 mm.; width: 2.2–2.8 mm.

*Habitat.* — Cheyenne and Laramie, Wyo. (H. Soltau); “Wyo.”; Colorado.

*Type.* — No. 9,757, U. S. National Museum.

The natural food plants of the species of *Notaris* occurring in America do not appear to have been positively ascertained, although Mr. F. M. Webster has surmised that *puncticollis* “may breed in the common *Typha latifolia* or cat-tail.” He observed this species attacking cabbage on land that had been drained (Insect Life, vol. vii, 1894, p. 206).

Allied European forms such as *Eirrhinus festucae* Hbst., have been observed breeding in the stems of *Scirpus*, and the beetles have been found on Cyperaceae, especially on *Carex*. The genus favors aquatic vegetation and the beetles are usually found in moist situations.

## STRYCHNINE AS FOOD OF *ARÆOCERUS FASCICULARIS* DE GEER.

BY ROBERT E. BROWN, S. J.,

MANILA, P. I.

The weevil, *Aræocerus fascicularis*, is well known in all parts of the world on account of its cosmopolitan habits. It feeds on all kinds of seeds and nuts, but one of the strangest which it has been known to eat is the St. Ignatius' bean, *Strychninos ignatii* Berg. This plant grows wild in many parts of the Philippines, but is especially plentiful in the Island of Samar, where the fruit is called by the natives pepita-sa-catbalongan and pepita de San Ignacio. The bean is exceedingly poisonous, though it is used by the natives as a remedy for certain diseases, and it is not uncommon, as a consequence, that people die from an overdose. A quantitative analysis of the bean gave as a result  $1\frac{1}{2}$  per cent. strychnine and  $\frac{1}{2}$  per cent. brucine.

Strychnine is one of the deadliest poisons known, yet this little beetle not only feeds on it, but actually breeds in the cavities which it has bored in the seed. In the Observatory Museum there was a bottle containing some ten Ignatius' beans and it was noticed that a male and female *A. fascicularis* had been enclosed with them. The insects seemed to be in good health and they began gnawing the beans without any evil effects. Wishing to see if the weevil could live on such deadly poison, the bottle was sealed and set aside and in about six months, when examined, it was found that ten adult insects were enjoying themselves within. They were taken out and the beans treated with bisulphide of carbon to kill any eggs that might have been deposited in them by the weevils. Two males and two females were then replaced in the bottle with the beans and the stopper sealed. In little more than a week they all died, but in two months young larvæ could be seen in the cavities of the beans and they all grew to maturity. Since that time more than four generations of *A. fascicularis* have been bred and no other food but the Ignatius' beans was given them.

Class I, HEXAPODA.

Order V, LEPIDOPTERA.

HETEROCERA AMERICANA.

By RICHARD H. STRETCH, E.M.,

WEST SEATTLE, WASH.

A quarter of a century ago the writer had in preparation a monograph of the Bombycidæ of North America, intended as an enlargement and completion of his Zygænidæ and Bombycidæ of North America, published in 1872. Various causes prevented the completion of the work at that time, but the plates were nearly all prepared and in part printed. So much work has been done on the group in the interim that the "Heterocera Americana" as prepared is obsolete; but I have turned the plates over to the editor of this Journal, who thinks them worthy to present to our readers. The plates illustrate the Arctiidæ and their allies. I wish to express my acknowledgments to the gentlemen who assisted me with material and otherwise in former years while the work was in preparation, Messrs. Henry Edwards, B. Neumoegen, E. L. Graef, F. Tepper and others.

EXPLANATION OF PLATES.

(Heterocera Americana, Plates II-XII.)

PLATE II.

- 1. *Crambidia pallida* Packard.
- 2. *Uteheisa bella* Linnæus.
- 3. *Uteheisa ornatricis* Linnæus.
- 4. *Uteheisa ornatricis* Linnæus.
- 5. *Uteheisa bella* var.
- 6. *Uteheisa speciosa* Walker.
- 7. *Scepsis fulvicolis* Hübner.
- 8. *Scepsis wrightii* Stretch.
- 9. *Scepsis matherwi* Grote.
- 10. *Scepsis edwardsii* Grote.
- 11. *Psychomorpha epimenis* Drury.
- 12. *Clemensia* ?\*

\* Probably *Nola minuscula* Zell.— Editor.



13. *Syntomeida ipomææ* Harris.
14. *Emydia ampla* Grote.
15. *Edwardsia brillians* Neumægen.
16. *Ctenucha sanguinaria* Strecker.
17. *Gnophala vermiculata*, ♂, Grote & Robinson.
18. *Gnophala vermiculata*, ♀, Grote & Robinson.
19. *Gnophala discreta* Stretch.
20. *Gnophala hopfferi* Grote & Robinson.
21. *Dahana atripennis* Grote.
22. *Cosmosoma omphale* Hübner.
23. *Halesidota trigona* Grote.
24. *Pygotenucha harrisii* Grote.
25. *Didasys belæ* Grote.
26. *Eudryas unio* Grote.
27. *Triprocris smithsonianus* Clemens.
28. *Triprocris fusca* H. Edwards.
29. *Harrisina coracina* Clemens.

## PLATE III.

1. *Cisthene tenuifascia* Harvey.
2. *Cisthene plumbea* Stretch.
3. *Cisthene unifascia* Grote & Robinson.
4. *Cisthene unifascia* Grote & Robinson.
5. *Byssophaga faustinula* Boisduval.
6. *Byssophaga nexa* Boisduval.
7. *Cisthene subjecta* Walker.
8. *Cisthene subjecta* Walker.
9. *Crocota ostenta* H. Edwards.
10. *Crocota quinararia* Grote.
11. *Crocota choriona* Reakirt.
12. *Crocota opella* Grote.
13. *Crocota opella* Grote.
14. *Crocota leta* Guérin.
15. *Crocota belfrageii* Stretch.
16. *Crocota nigricans*, ♀, Reakirt.
17. *Crocota nigricans*, ♂, Reakirt.
18. *Crocota ferruginosa* Walker.
19. *Crocota costata* Stretch.
20. *Crocota rubicundaria* Hübner.
21. *Crocota rubicundaria* Hübner.
22. *Crocota choriona* Reakirt.
23. *Crocota choriona* Reakirt.
24. *Crocota choriona* Reakirt.
25. *Crocota obscura* Strecker.
26. *Crocota obscura* Strecker.
27. *Crocota* ? \*

\* An aberration of *aurantica* Hübn., probably not deserving a separate name. — Editor.

28. *Crocota bimaculata* Saunders?
29. *Hypoprepia fucosa* Hübner.\*
30. *Hypoprepia fucosa* Hübner.†
31. *Hypoprepia fucosa* Hübner.‡
32. *Cisthene ? lactea* Stretch.
33. *Euphanessa mendica* Walker.
34. *Lithosia bicolor* Grote.
35. *Lithosia cephalica* Grote & Robinson.
36. *Lithosia candida* H. Edwards.
37. *Lithosia casta* Sanborn.
38. *Harrisina (Pygoteuucha) funerea* Grote.
39. *Ameria unicolor* Robinson.
40. *Harrisina americana* Guérin.
41. *Harrisina metallica* Stretch.
42. *Harrisina australis* Stretch.
43. *Clemensia irrorata* H. Edwards.
44. *Clemensia irrorata* H. Edwards.
45. *Clemensia umbrata* Packard.
46. *Pyromorpha dimidiata* Herrich-Schæffer?
47. *Triprocris marteni* French.
48. *Acoloitilus falsarius* Clemens.
49. *Lycomorpha palmerii* Packard.
50. *Anatolmis fulgens* H. Edwards.
51. *Lycomorpha pholus* Drury.
52. *Lycomorpha miniata* Packard.
53. *Lycomorpha constans* H. Edwards.
54. *Lycomorpha constans* H. Edwards.
55. *Cydosia imitella* Stretch.
56. *Cydosia aurivitta* Grote & Robinson.

## PLATE IV.

1. *Epicallia virginalis* Boisduval.
2. *Epicallia virginalis* Boisduval.
3. *Epicallia virginalis* var. *uttata* Boisduval.
4. *Platarctia parthenos* Harris.
5. *Euprepia yarrowi* Stretch.
6. *Callimorpha lecontei* Boisduval.
7. *Callimorpha lecontei* Boisduval.
8. *Callimorpha reversa* Stretch.
9. *Callimorpha lecontei* Boisduval.
10. *Callimorpha reversa* Stretch.
11. *Callimorpha interrupto-marginata* de Bauvois.
12. *Callimorpha clymene* Brown.
13. *Leptarctia dimidiata*, ♂, Stretch.

\* Normal form. — Editor.

† *H. miniata* Kirby. — Editor.

‡ *H. cadaverosa* Strk. — Editor.

14. *Leptarectia dimidiata*, ♂, Stretch.
15. *Leptarectia dimidiata*, ♂, Stretch.
16. *Leptarectia californica* Walker (*leni* Boisd.).
17. *Leptarectia californica* Walker.
18. *Leptarectia californica* Walker.
19. *Leptarectia adnata* Boisdual.
20. *Leptarectia adnata* Boisdual.
21. *Leptarectia californica* Walker.
22. *Leptarectia californica* Walker.
23. *Leptarectia decia* Boisdual.

## PLATE V.

1. *Arctia docta*, var. *arizonensis*, ♂, Stretch.
2. *Arctia docta*, var. *autholea*, ♂, Boisdual.
3. *Arctia docta*, var. *autholea*, ♀, Boisdual.
4. *Arctia superba*, ♂, Stretch.
5. *Arctia virguncula*, ♂, Kirby.
6. *Arctia bolanderi*, ♂, Stretch.
7. *Arctia nais* Drury, var. *decorata*, ♀, Saunders. Copy from Grote.
8. *Arctia nevadensis*, ♂, Grote. Copy from Grote.
9. *Arctia nevadensis*, ♂, Grote.
10. *Arctia nevadensis*, ♀, Grote.
11. *Arctia anna*, ♀, Grote.
12. *Arctia persephone*, ♂, Grote. Copy from Grote.
13. *Arctia virgo*, ♂, Kirby.
14. *Arctia virgo*, ♀, Kirby, var. *simplex* Stretch.
15. *Arctia saundersii*, ♂, Grote.
16. *Arctia arge*, ♂, Drury.
17. *Arctia arge*, ♀, Drury.
18. *Arctia blakei*, ♂, Grote.
19. *Arctia phalerata*, ♂, Harris.
20. *Arctia phalerata*, ♂, Harris.
21. *Arctia phalerata*, var. *incarnata*, ♂, n. var.
22. *Arctia intermedia*, ♂, Stretch.
23. *Arctia intermedia*, ♂, var. *stretchii* Grote.
24. *Arctia rectilinea* French.
25. *Arctia gelida*, var. *speciosissima* Moeschler.
26. *Arctia intermedia*, var. *circa*, n. var.

## PLATE VI.

1. *Arctia achaia*, ♂, var. *ornata* Packard.
2. *Arctia achaia*, ♀, var. *ornata* Packard.
3. *Arctia achaia*, ♂, var. *maculosa*, n. var.
4. *Arctia achaia*, ♀, var. *maculosa*, n. var.
5. *Arctia achaia*, ♂, Boisdual, type.
6. *Arctia achaia*, ♀, Boisdual.
7. *Arctia achaia*, ♂, var. *ochracea* Stretch.

- 8. *Aretia achnia*, ♂, var. *rivulosa*, n. var.
- 9. *Aretia achnia*, ♀, var. *rivulosa*, n. var.
- 10. *Aretia achnia*, ♂, var. *ochracea-rivulosa*, n. var.
- 11. *Aretia achnia*, ♀, var. *ochracea* Stretch.
- 12. *Aretia dahurica*, ♂, Boisduval.
- 13. *Aretia dahurica*, ♀, Boisduval.
- 14. *Aretia obliterated*, ♂, Stretch.
- 15. *Aretia achnia*, ♂, var. *ochracea*, aberration.
- 16. *Euprepia cajo*, ♀, var. *americana* Harris.
- 17. *Kodiosoma tricolor* Stretch.
- 18. *Kodiosoma eazsii* Stretch.
- 19. *Kodiosoma niger* Stretch.
- 20. *Kodiosoma fulva* Stretch.
- 21. *Nemeophila plantaginis*, ♂, Linn., var. *geometrica* Grote. Copy from Grote.
- 22. *Nemeophila plantaginis*, ♂, var. *cichorii* Grote.
- 23. *Nemeophila plantaginis*, ♂, var. *caespitis* Grote.
- 24. *Nemeophila plantaginis*, ♂, var. *alascensis*, n. var.\*
- 25. *Nemeophila plantaginis*, ♂, var. *alascensis*, n. var.
- 26. *Nemeophila plantaginis*, ♂, var. *alascensis*, n. var.
- 27. *Nemeophila plantaginis*, ♀, var. *alascensis*, n. var.
- 28. *Nemeophila plantaginis*, ♀, var. *alascensis*, n. var.

## PLATE VII. ✓

- 1. *Aretia docta*, var. *antholea*, ♀, Boisduval.
- 2. *Aretia nais*, ♀, var. *decorata* Saunders.
- 3. *Aretia nais*, ♀, var. *decorata* Saunders.
- 4. *Aretia phalerata*, ♂, var. *incarnata* Stretch.
- 5. *Aretia phalerata*, ♂, var. *incarnata* Stretch.
- 6. *Aretia elongata*, ♀, Stretch.
- 7. *Aretia michabo*, ♂, Grote.
- 8. *Aretia dahurica*, ♂, Boisduval.
- 9. *Aretia williamsii*, ♀, Dodge. Copy from Dodge.
- 10. *Aretia phyllira*, ♀, Drury. Copy from Drury.
- 11. *Aretia nais*, ♂, Drury. Copy from Drury.
- 12. *Aretia placentia*, ♂, Hübner (*phyllira* Hüb.). Copy from Hübner.
- 13. *Aretia phalerata*, ♂, Harris (*nais* Hübner). Copy from Hübner.
- 14. *Aretia figurata*, ♂, Drury. Copy from Drury.
- 15. *Aretia quensellii*, ♀, Geyer. Copy from Geyer.
- 16. *Aretia figurata*, ♂, var. *celia* Saunders.
- 17. *Aretia figurata*, ♀, var. *celia* Saunders.
- 18. *Aretia phyllira*, ♂, Drury.
- 19. *Aretia phyllira*, ♀, Drury.
- 20. *Aretia placentia*, ♂, Sm.-Abbott.
- 21. *Aretia placentia*, ♀, Sm.-Abbott.
- 22. *Aretia figurata*, ♂, var. *pallida* Strecker. Copy from Strecker

\* This is what we have called var. *modesta* Pack. — Editor.

23. *Arctia cervinoides*, ♂, Strecker. Copy from Strecker.
24. *Arctia persephone*, ♂, Grote.
25. *Euprepia opulenta*, ♂, Hy. Edwards.

## PLATE VIII.

1. *Arctia geneura*, ♂, Strecker. Copy from Strecker.
2. *Arctia rectilinea*, ♂, var. *conspicua*, n. var.
3. *Arctia docta*, ♂, Walker.
4. *Arctia virgo*, ♂, var. *simplex* Stretch.
5. *Arctia virgo*, ♀, Linnaeus.
6. *Arctia blakei*, ♂, Grote.
7. *Arctia michabo*, ♂, Grote.
8. *Arctia michabo*, ♀, Grote.
9. *Arctia michabo*, ♀, Grote.
10. *Arctia approximata*, ♀, Stretch.
11. *Arctia intermedia*, var. *stretchii* Grote.
12. *Arctia nais*, ♂, Drury.\*
13. *Arctia nais*, ♀, Drury.†
14. *Arctia nais*, ♀, var. *decorata* Saunders.\*
15. *Arctia phalerata*, ♀, Harris.‡
16. *Arctia phalerata*, ♀, Harris.\*
17. *Arctia phalerata*, ♀, var. *pulcherrima*, n. var. §
18. *Arctia phalerata*, ♀, var. *pulcherrima* n. var.
19. *Arctia arge*, ♂, var. *strigosa* Stretch.
20. *Arctia virguncula*, ♂, Kirby.
21. *Arctia nais*, var. *decorata* (radians of Walker).
22. *Arctia figurata*, ♀, var. *suowi* Grote.
23. *Arctia placentia*, ♀, var. *fluminea* Neumögen.
24. *Arctia figurata*, ♂, var. *excelsa* Neumögen.

## PLATE IX.

1. *Callimorpha lecontei*, var. *contigua* Walker.
2. *Callimorpha lecontei*, var. *confinis* Walker.
3. *Callimorpha lecontei*, var. *montana* Neumögen.
4. *Arctia figurata*, ♀, Drury.
5. *Arctia determinata*, ♂, Neumögen.
6. *Arctia incorrupta*, ♂, type, H. Edwards.
7. *Arctia incorrupta*, ♂, H. Edwards.
8. *Arctia incorrupta*, ♂, var. *ochracea* Neumögen.
9. *Arctia incorrupta*, ♀, H. Edwards.

\* This is *radians* Walk. — Editor.

† This appears to be a ♂ of *decorata*. No. 14 is omitted from the text. It represents a ♀ *decorata*. — Editor.

‡ We should call this the ♀ of *nais*. — Editor.

§ We have considered this to be the usual ♀ of *phalerata*. — Editor.



10. *Arctia complicata*, ♂, Walker.
11. *Arctia figurata*, ♂, var. *celia* Saunders.
12. *Arctia placentia*, ♀, Sm.-Abbott.
13. *Arctia placentia*, ♀, Sm.-Abbott. Copy from Smith and Abbott.
14. *Arctia persephone*, ♂, Grote.
15. *Arctia persephone*, ♂, Grote.
16. *Arctia figurata*, ♂, var. *f. pallida* Strecker.
17. *Leptarctia californica* Walk.
18. *Arctia gelida*, ♂, Moeschler.
19. *Callimorpha reversa* Stretch.
20. *Callimorpha reversa* Stretch.\*
21. *Callimorpha reversa* Stretch.
22. *Callimorpha lecontei* Boisduval (hybrid).
23. *Callimorpha lecontei*, var. *fulvicosta* Clem.

## PLATE X.

1. *Hyphantria cunea*, ♂, Drury, var. *textor* Harris.
2. *Hyphantria cunea*, ♂, Drury, var. *textor* Harris.
3. *Hyphantria cunea*, ♂, Drury, var. *punctata* Fitch.
4. *Hyphantria cunea*, ♂, Drury type.
5. *Seiartia elio*, ♀, Packard.
6. *Euchates egle*, ♀, Drury.
7. *Euchates elegans*, ♂, Stretch.
8. *Euchates collaris*, ♀, Fitch.
9. *Euchates oregonensis*, ♂, Stretch.
10. *Euchates oregonensis* Stretch.
11. *Leucarctia albida*, ♂, Stretch.
12. *Leucarctia aerea*, ♀, Drury.
13. *Leucarctia aerea*, ♂, Drury.
14. *Spilosoma vestalis*, ♀, Packard.
15. *Spilosoma latipennis*, ♀, Stretch.
16. *Spilosoma virginica*, ♀, Fabricius.
17. *Antarctia rufula*, ♂, Boisduval.
18. *Antarctia rufula*, ♂, Boisduval.
19. *Antarctia rufula*, ♂, Boisduval.
20. *Antarctia rufula*, ♀, Boisduval.
21. *Pyrrharcia isabella*, ♀, Sm.-Abbott.
22. *Pyrrharcia isabella*, ♂, Sm.-Abbott, var. *californica*, larva uniform dark gray.
23. *Pyrrharcia isabella*, ♂, Sm.-Abbott.
24. *Phragmatobia fuliginosa*, ♂, Harris.
25. *Phragmatobia fuliginosa*, ♀, Harris.

## PLATE XI.

1. *Halisidota argentata*, ♀, Packard.
2. *Halisidota sobrina*, ♂, Stretch.

\* This is *C. confusa* Lyman. — Editor.

3. *Halisidota tessallata*, ♂, Sm.-Abbot.
4. *Halisidota maculata*, ♀, Harris.
5. *Halisidota maculata*, ♂, Harris.
6. *Halisidota ingens*, ♀, H. Edwards.
7. *Halisidota edwardsii*, ♀, Packard.
8. *Halisidota edwardsii*, ♀, var. *labecula* Grote.
9. *Halisidota ambigua*, ♂, Strecker. Copy of Strecker.
10. *Halisidota caryæ*, ♂, Harris.
11. *Halisidota roseata*, ♂, Walker.\*
12. *Halisidota roseata*, ♂, Walker.†
13. *Arachnis picta*, ♂, Packard.
14. *Sciaridia echo*, ♀, Sm.-Abbot. Copy of Sm.-Abbot.
15. *Ecpantheria scribonia*, ♂, Stoll.
16. *Ecpantheria scribonia*, ♂, Stoll.
17. *Ecpantheria scribonia*, ♂, Stoll.

## PLATE XII.

1. *Nemeophila chichorii* Grote & Robinson.
2. *Nemeophila petrosa* Walker.
3. *Nemeophila geometrica* Grote.
4. *Aretia pallida*, ♀, Packard.‡
5. *Aretia pallida*, ♂, Packard.‡
6. *Phragmatobia rubricosa*, ♂, Harris.
7. *Phragmatobia rubricosa*, ♀, Harris.
8. *Phragmatobia assimilians* Walker. Walker's type.
9. *Antarctia proba* H. Edwards.
10. *Antarctia rubra*, ♂, Neumegen.
11. *Antarctia rubra*, ♀, Neumegen.
12. *Phragmatobia dubia* Neumegen.
13. *Euchates vivida* Grote.
14. *Euchates eglenensis* Clemens.
15. *Euchates nivalis*, new species.¼
16. *Euchates collaris* Fitch.
17. *Euchates pudens* H. Edwards.
18. *Arachnis semiclara*, new species.||
19. *Euchates perlevis* Grote.
20. *Euchates zonalis* Grote.
21. *Euchates spraguei* Grote.
22. *Leucarctia? permaculata* Packard.

\* This is *Euerythra trima ulata* Smith. — Editor.

† This is *E. phasma* Harvey. — Editor.

‡ Considered to be aberrations of *Hyphantria cunea*. — Editor.

¼ White form of *eglenensis*. — Editor.

|| Nearest to *A. albescens* Hampson from Guatemala and possibly the ♀ of it; or it may be an *Ecpantheria* near *suffusa* Schaus. The spurs of hind tibiae which separate *Arachnis* and *Ecpantheria* are not shown. — Editor.

23. *Euhalesidota pura* Neumcegen.
24. *Halesidota ambigua* Strecker.
25. *Halesidota mixta* Neumcegen.
26. *Halesidota significans* H. Edwards.
27. *Phryganidia californica* Packard.
28. *Alypia maccullochii* Kirby.

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## ON THE SPECIFIC VALIDITY OF *THANAOS AUSONIUS* LINTNER.

BY JOHN H. COOK,

ALBANY, N. Y.

### PLATE III.

During the last four years I have been searching for *Thanaos ausonius* (Lintn.) on the pine barrens west of Albany, N. Y. The individual which Lintner described under that name was taken in this locality, and it seemed reasonable to expect it here if anywhere. Over five hundred butterflies belonging to this genus were taken, of which two hundred and eleven were *T. martialis*. No "*ausonius*" appeared to reward my efforts.

At Dr. Dyar's suggestion I made a comparative study of *martialis* and *icelus* with a view to determining, if possible, whether or not *ausonius* is entitled to specific distinction. This inquiry has been diligently prosecuted, and the results are here given.

A glance at the genitalia of *ausonius*\* was sufficient to prove it distinct from *icelus* and to show that if not a good species it must be regarded as a sport of *martialis*. From this species it was separated by Lintner on the grounds of its small size, and the absence of the fenestrate spots on the primaries; the other characters "distinguishing" it being of comparatively little importance.

Considering the genitalia of the greatest morphological value I first compared the tip of the right clasp of "*ausonius*" with the figure thereof given in Scudder's "Butterflies of the Eastern United States and Canada." This figure I found to be measurably accurate though somewhat diagrammatic. I next compared the tip of the left clasp of "*ausonius*" with Scudder's figure of the left clasp of *martialis*, and

\* The type in the Lintner memorial collection was studied in detail by the writer.

found them somewhat different. I then made a comparative study of the clasps of twenty-five *martialis*, and found the following to be true: there is considerable variation in the detail of both clasps, the general character however remaining the same; the right clasp varies to a greater degree than the left; there is a greater difference between the corresponding clasps of individuals recognized under the common name of *martialis* than between that of "*ausonius*" and the usual *martialis*. Plate III, fig. 1, represents the tip of the right clasp of *martialis* as found in sixteen of the twenty-five examined. The view is taken from the side, a little above, and a little behind. Fig. 2 shows the same organ of *ausonius* from the same position. (These drawings magnified  $14\frac{1}{2}$  times.)

It will be seen that (to quote from Scudder) "The blade of the right clasp (of '*ausonius*') differs (from that of *martialis*) in its greater slenderness, and prolongation; the denticle of the upper edge is larger, and more prickly so that the blade seems to narrow more abruptly beyond it, while the bent apex is more distinctly conical." "And pointed" is added, but I fail to agree with this. Fig. 3 shows the usual sharpness of the apex in *martialis* and that of the specimen under discussion is hardly different. But are these slight differences of specific value? By no means. Compare figs. 4 and 6, which are drawn from undoubted *martialis*, with fig. 5, which is *ausonius*. (The view here is from a little further above than in figs 1 and 2.) Fig. 4 is the usual form, fig. 6 an extreme modification. Between these there may be found several intermediate forms. (These figures enlarged 22 times.)

The left clasp of *ausonius* does not differ from the usual left clasp of *martialis* as represented in figs. 7, 8 and 9.

Fig. 7 shows the tip of left clasp seen directly from the side (as the genitalia are mounted, enlarged 18 times).

Fig. 8 is the same seen from in front at an angle of about  $45^\circ$  (18 diameters).

Fig. 9 is the same from directly above (as the genitalia are mounted; 25 diameters).

I have been unable to find a specimen with which I can reconcile Scudder's representation of the apex of the left clasp and, if his figure is accurate, it must be looked upon as a departure from the usual pattern.

Figs. 11 and 12 show the apical half of right and left clasps respectively (after Scudder).

Fig. 10 represents the genitalia of *martialis* as seen from below (25 diameters) showing the angle at which the clasps in each instance were mounted for examination.

It will thus be seen that the modifications observed in the clasps of the individual named *Thanaos ausonius* are well within the limits of the variation exhibited by the species *T. martialis*.

I next removed with a bristle a few androconia from the costal fold of the left wing of "*ausonius*," and found them identical with the androconia of *martialis*.

The only other difference worthy of note is the absence of the hyaline spots. Of *martialis*, ninety-one females were examined and one hundred and twenty males. The number of such areas on a wing was found to vary from seven to three. The location of the several spots is shown in fig. 13 and for easy reference I have lettered them. No single specimen had more than seven of the possible eight, the one ♀ showing *a*, lacking *θ* within the cell. The most persistent of these spots are *ε*, *ζ* and *η*, all of which appear in each of the specimens examined. The ♀♀, as the more conservative element of the species, constantly show a tendency to retain all; the ♂♂ as the more variable element tend to lose them. As *ausonius* is a ♂ I shall here give only the results of my examination of the males.

<i>a</i>	was	missing	in	120,
<i>β</i>	"	"	"	111,
<i>θ</i>	"	"	"	109,
<i>γ</i>	"	"	"	19,
<i>δ</i>	"	"	"	6,
<i>ε</i> , <i>ζ</i> , <i>η</i>	were	"	"	0.

In three specimens *ε*, *ζ* and *η*, the only ones which persist, are greatly reduced and of rounded outline, and it does not seem to me that the loss of these is sufficient warrant for the specific distinction of a butterfly no second specimen of which has ever been taken.

These hyaline areas are little patches of the membrane which have been partially denuded of scales, the atrophied insertion of each one of which is plainly visible with a  $\frac{1}{6}$  objective. But the denudation is only partial, many of the scales persisting, although for the most part wanting in pigment. Yet not always unpigmented, for occasionally a single one or a group is to be found furnished with the rich dark brown color of the submarginal spots in which the hyaline areas are set.

There can be no doubt but that *ausonius* is merely a color sport of *martialis*. The wings having been suffused and the fenestrate spots reclaimed by the scales under conditions which undoubtedly can be supplied in the laboratory but are not likely to occur very often in nature.

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## NOTES ON THE GENUS *CARIPETA* WITH DESCRIPTION OF A NEW SPECIES.

BY LOUIS W. SWETT,

MALDEN, MASS.

In studying the genus *Caripeta*, I came across a strange error in the description and figuring of *Caripeta angustiorata* Walker, in Packard's Monograph of the Geometridæ. (Vol. X, U. S. Geol. Survey of the Territories, p. 238.) Entomologists in general have regarded, I believe, the insect figured by Packard in this monograph (Plate IX, fig. 52), as the true *C. angustiorata*, which I will prove is incorrect. While reading over the description I noticed it did not correspond exactly with the plate and this set me thinking, and I resolved to go over Packard's specimens in the Cambridge Museum of Comparative Zoölogy. To my surprise I found a very different insect from his figure, larger and with yellow streaks on the veins of the forewings, labelled "Smith, Norway, Me." (two specimens). Then I went over the collection carefully but could find no moth like the figure and I thought perhaps the labels had been changed, but I disproved this theory by finding a similar specimen (Packard mentions this in Monograph) in the Minot collection of the Boston Society of Natural History, through the kindness of Mr. C. Johnson. Working on these lines I found Strecker's description (Lep. Rhop. Het. Suppl. 2, 9, 1899), of *Caripeta seductaria* to correspond with Packard's insects, likewise to Walker's description of *C. angustiorata*. Having some ten specimens of each, that is, of Packard's figure, and his specimens of *angustiorata* corresponding to *seductaria* Streck., I sent a few to Sir George Hampson of the British Museum for comparison with Walker's types. He replied that Strecker's *C. seductaria* (like specimens in Packard collection at Cambridge), were Walker's *C. angustiorata*, this making *seductaria* a synonym of *angustiorata*.



In reference to the insect Packard figured, it has not been described, there being a similar specimen in the Grote collection bearing the label of *C. angustiorata*, which is, of course, wrong, as Walker's name has priority. Mr. Strecker, no doubt, made his mistake through Packard's plate. Holland, in his "Moth Book," figures the true *C. angustiorata* Walk. very clearly, and Packard in his Monograph figures (Plate 9, fig. 52) the insect I am going to describe. I wish to thank Dr. Dyar, of the U. S. National Museum for valuable information, also Mr. G. W. Taylor, of Wellington, B. C., Dr. Russel, of Winchendon, Mass., and Mr. C. W. Johnson for loan of specimens.

**Caripeta crimiosa, new species.**

Smaller than *C. angustiorata*; general color of fore wings dark reddish fawn; hind wings pale yellow. Tongue developed, palpi short, antennæ bipectinate in ♂, apex simple, in ♀ dentate; fore tibia with small tuft of blackish hairs, hind tibiæ swollen; 2 pairs of spurs with hair pencil in the male.

Basal part of fore wing with triangular reddish patch, bordered by a silver white line of same shape, in some cases breaking through the median brown patch, completely separating and joining with outer silvery line; costal spot elongated, small, as a rule, not so large as in *angustiorata*; beyond is a silvery line running from costa to inner margin, usually broadened opposite discal dot and again opposite point of basal silver line; beyond an ochreous band, then a bluish white irregular band dotted with black atoms; fringe reddish brown, tipped with black. Hind wings with no markings, dotted near border with a few black atoms. Beneath pale yellow, more ochreous on veins and at margin of wings; a pale mesial band runs across secondaries, making two scallops.

Described from two ♂, Winchendon, Mass., one ♂, Franktown, Nevada (now in the British Museum), one ♀, Old Orchard, Maine, one ♀, Winchendon, Mass., and one ♂, Old Orchard, Maine (now in the U. S. National Museum, type no. 9802).

Can be separated from *C. angustiorata* by its smaller size, bluish line near border of fore wing, no silvery streaks on the veins extending to border and the black atoms on hind wings, with pale mesial line on under side.

## SOME NEW GEOMETRIDÆ FROM ARIZONA.

BY GEO. W. TAYLOR,

WELLINGTON, B. C.

Among a number of Geometridæ kindly lent to me for study by the U. S. National Museum, I find several that are apparently new to science. Two of these, both belonging to the genus *Sabulodes* as defined by Hulst, are described in the present paper.

### *Sabulodes arizonata*, new species.

Expanse 35 mm.

Palpi, head, thorax and abdomen and all wings above fawn color with an ochreous tinge, the female being of a rather brighter tint than the male.

Fore wings falcate, more evidently so in the female, hind wings distinctly angled at vein 4.

Fore wings crossed by 2 straight buff lines (bordered with whitish) more than twice as distant from one another on the costa as on the inner margin; discal points faint.

Hind wings hardly lighter than fore wings; a single straight extra discal line; discal points very small and indistinct.

Beneath uniform pale yellowish fawn, quite without markings in ♀, but with a few black specks and the very faintest indications of markings as above, in the ♂.

Described from three specimens: ♂, Huachuca Mts., Arizona, May 8-15, U. S. National Museum, type no. 9799; ♂, Cochise Co., Arizona, April 20, 1904, ♀, Cochise Co., Arizona, July 5, 1904, in my own collection.

The three specimens present slight differences and if it should prove that they are not conspecific, the first-named specimen must be considered the type of the present species.

*Sabulodes arizonata* belongs to that group in the genus which contains *truxaliata* Guenée, *cervinaria* Packard, *aurantiacaria* Packard and *novellata* Hulst. From the first three of these *arizonata* differs in having the inner line straight instead of gently curved. From *novellata*, which also has a straight inner line, it may be distinguished by the absence of any trace of a submarginal hair line above or below and by the approximation of the outer and inner lines on the inner margin of the fore wings.

***Sabulodes costinotata*, new species.**

Expanse 35 mm.

This is a species resembling, in almost everything except color, the ♀ of *S. arcasaria* (= *sulphurata* Pack.).

Palpi, head and collar dull purplish brown. Thorax, abdomen and upper surface of wings pale wood brown, paler than *S. furciferata* Packard. Markings as in *sulphurata* except that both outer and inner lines are more evident. The outer line is continued across the hind wings but there is no conspicuous spot at the termination of this line on the inner margin of the wing as there is in *sulphurata*. Beneath the markings are reproduced as in *sulphurata*. Discal dots distinct above and below.

The type specimens are three in number and are all females: Durango, Colorado, U. S. Nat. Museum, type no. 9800; Phoenix, Arizona (two specimens), in my collection.

***Sicya snoviaria* Hulst.**

In the same collection (U. S. Nat. Mus.) there is another specimen on which I may comment here.

It is labelled "Santa Catalina Mts., Pinal Co., Arizona, April 8-15" and is a ♀ apparently conspecific with a ♂ in my own collection which I suppose to be the *Heterolocha snoviaria* Hulst, described from New Mexico. Hulst's type was a single ♂ and my specimen agrees well with the description except that it has a conspicuous basal line on the fore wing which is not mentioned by Hulst.

The ♀ specimen, however, has simple antennæ and very short palpi and therefore belongs to the genus *Sicya* and not to *Heterolocha* or *Neoterpes*. If my determination of *snoviaria* is correct, that species must be removed to *Sicya*; if otherwise then the specimens noted above will represent a new species in that genus.

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**DESCRIPTIONS OF TWO LEPIDOPTEROUS LARVÆ.**

By R. E. KUNZÉ, M.D., PHARM.D.,

PHOENIX, ARIZONA.

**LARVA OF SPHINGICAMPA HEILIGERODTH HARVEY.**

Every autumn I collect on the desert close to the Salt River, near Phoenix, a few of *Gyascutus obliteratus*, a good Buprestid found on Palo Verde (*Parkinsonia microphylla*) and while thus engaged found for the first time in nine years the larva of *heilighrodthii*. This brilliant larva is readily detected, its silvered ornamentation reflected by

the sun makes it conspicuous on the tips of the minute-leaved Palo Verde, a small tree with few branches. Therefore it is impossible that on previous collecting, it could have escaped detection if present. I found the larva on September 28 and 29, 1904. From the size I judged it to be in latter part of third stage.

Larva covered by prominent spinulated tubercles, on a ground color of apple green. Face green, a white line on each side of triangular space, edged by a narrow black line. Mouthparts blackish. On joint 2, a circle of silvered granulation between spiracles. Thoracic tubercles spinulated, 6 mm. long. On joints 3 and 4, there are four spinulated tubercles, of which there are two on each side, one above the other. The subdorsal tubercle is of a purple or violet color, the lateral apple-green. Spinules of subdorsal tubercle black, those of lateral are green. From joints 5 and inclusive to 12 there are on each side two silvered tubercles, wedge-shaped, one above the other, the inferior resting on the infrspiracular line. All the lateral tubercles on inner side bright red. A circle of silvered granulations just back of tubercles of each joint. On joint 13, a spinulated tubercle, 4 mm. long, green on tip, reddish brown at base; spinules tipped with green and whitish at base. Three small, silvered tubercles on last joint above anal plate. Between the dorsal tubercles of each joint, two silvered granulations. Anal plate lined by a triangle of white granulations. Thoracic legs green, only granulated at base. Prolegs much granulated from base to feet or clasping part which is brownish. Abdominal part concolorous with dorsal. Spiracles black. Infrspiracular line pink with lilac reflection, much the same as in *H. iv.*

Length at rest 29 mm. or  $1\frac{1}{4}$  inch, in motion 32 mm. or  $1\frac{1}{4}$  inch. Width 5 mm. or  $\frac{1}{8}$  inch.

October 24, 1904, I discovered a full-grown larva of this Sphingicampid on a mesquite tree in a grove of my cactus garden, close to my tent-house, and on the second day went again to the desert, where I had taken the first larva, with the result of adding four more full-grown larvæ, of which one was crippled. I spent that day and the following hunting that larva—all on *P. microphylla*, the leaves of which are so very small that I offered a larger-leaved species, *Parkinsonia torreyana*, to my captures, which proved acceptable. I had *torreyana* growing in my garden and saved time by using it instead of the other. The cripple I put in alcohol, and mailed it to Prof. A. S. Packard. I noticed the following change in this second lot of larvæ, all of which pupated within two days after capture.

General color apple-green. Mouthparts brownish. Antennæ white. Outer or exterior side of the tubercles white, and but little spinose. Inner side pink, tipped white, at the base green, little spinose. Small tubercles silvered, tipped pink, cuneiform and pointed, the outer surface dazzling in the sunlight like a mirror. Dorsal row of tubercles longest, 2 mm. long. Subdorsal tubercles  $1\frac{1}{2}$  mm. long.

A spinose tubercle on penultimate joint pink, tipped white, at base green. Spiracular line violet-lavender. Spiracles black, edged white. Thoracic feet green, toes brownish. Abdominal feet and toes brownish, at base green.

Length at rest, 45 mm.; in motion, 54 mm.; diameter 8 mm.

Larvæ pupated in stone jar, partly filled with a sandy loam, and a few weeks later removed three pupæ, of the usual shape of a *Sphingicampa*. May 10, 1905, a fine ♀ emerged, which during the night oviposited a few ova of a transparent, pea-green tint. August 8th another ♀ emerged which not being looked for, had become a total wreck. Of all the larvæ I ever have seen or bred East or West, this Sphingicampid is the most beautifully marked and ornamented. Its proper habitat is southeastern Texas and Mexico. I have received the imago from Comal County, Texas.

#### LARVA OF *COPIDRYAS COSYRA* DRUCE.

During August, 1904, I discovered some larvæ feeding on the tender young joints of a cactus — *Opuntia arbuscula*, a prickly-pear — having cylindric branches or segments, of which I cultivated a bed on my cactus ranch. The plants I had collected fifteen miles north of town in February of the same year. The larva was of cylindric shape, olivaceous in color, and more or less covered with fine hairs. I sent two to Dr. Harrison G. Dyar, with some of the foodplant. The larvæ were inflated for the U. S. Nat. Museum, but he was unable to recognize the insect. In the meantime I caged a number of good-sized larvæ in a stone jar containing loam, and obtained six or eight pupæ, which transformed a few inches below the surface. Early in the spring of 1905, I sent all these pupæ to Dr. Dyar, inasmuch as I had often to absent myself, collecting cacti all over this territory for export, and could not watch the pupæ. In due course of time Dr. Dyar informed me that he had obtained imagines of *Copidryas cosyra*, from the pupæ I sent him, and requested I should watch for more of these larvæ and take notes during breeding of the same.

Early in August I found this larva again on the prickly pear, from one half up to three fourths inch in length, and in a few days collected eleven or twelve larvæ. Not having an empty stone jar convenient, I had to place the young larvæ in a tin canister, which was kept inside of my tent-house. We had the hottest summer for a decade, with a temperature of 115 degrees in the shade and the larvæ were killed.

The first larvæ I found August 9, 1905, and the smallest measured 12 mm. in motion, and 2 mm. in width.

General ground color olivaceous brown. A white dorsal interrupted line, and two white subdorsal lines. On each joint a transverse row of short black tubercles, encircled by a white line. A long white hair from the point of the black tubercle. On joints 2, 3 and 4 were four tubercles, of which the middle ones were smallest. On joint 5 were four larger tubercles of equal size. On joint 6 were six tubercles, on joint 7 were eight tubercles, of which some very small. On joint 8 were six tubercles, two of which much larger. On joints 9 and 10 also six tubercles, but so small on the last, it was difficult to ascertain exact number. On joint 11 there were four tubercles in the row, preceded by two anteriorly on the dorsum. On joint 12 were placed six tubercles in two rows like the preceding segment, but larger. On the last joint four small tubercles. Head black with two white tubercles on occiput. Mouthparts blackish. Thoracic feet black. Clasper blackish.

August 10 noted a larva of 20 mm. length, 3 mm. width.

Head oval; a white triangular mark in the middle. On each side two convex bodies meeting at the vertex, shining, mottled olivaceous and white, covered by a few small white hairs. Mouthparts blackish. On the second joint twelve black tubercles, of which two dorsal and two subdorsal, the largest covered by hairs, and the four lowest crowded together. On third joint are twelve black tubercles, the four uppermost largest, and the lower lateral only one-fourth as large. On joint 4 the same. On joints 5, 6 and 7 the two tubercles each side of central dorsal line are larger than any other of the body. On joint 5 the smallest tubercles number five on each side, on joint 6 are five tubercles near intraspicular line, rather crowded, and on joint 7 are only four on each side. On joint 8 ten tubercles. On joint 9 and 10 twelve tubercles. On joint 11 ten tubercles, on the penultimate, twelve tubercles. On joint 13 are a number of minute, scattered tubercles. Below the clasper two larger black tubercles. Thoracic and abdominal legs black. The penultimate and preceding joint more brownish than olivaceous. Surface of body smooth, shining.

August 19, most of the larvæ perished. The last and largest was  $28\frac{1}{2}$  mm. in length, and 6 mm. in width at the middle of the body, and 5 mm. at penultimate joint.

Longest hairs  $4\frac{1}{2}$  mm. in length. The hairs on head and joint 2, as well as on the penultimate and last joint, only half so long. Width of head  $3\frac{1}{2}$  mm. Face oval, ornamented by black spots. An irregular black groove between checks and vertex. Eyes black, edged white above. Lips whitish. Ground color ivory white. Four white longitudinal lines  $\frac{1}{2}$  mm. in width, irregular in outline. Intraspiracular line not quite so wide. There is more white color on joints 5 and 11 than any other. The white of joint 3 uniform in width. Tubercles on all joints longer, otherwise much the same. Joint 12 is much wider than any other. Anal plate irrorated black on white surface. Clasper much the same in color as the prolegs, with black on outer parts. Spiracles black, encircled by a white line. Exterior surface of thoracic feet pitchy black, shining, the same as external surface of prolegs. Inner side of thoracic feet cinereous. Inner side of prolegs white. Between prolegs the adominal surface is a kind of pinkish ochraceous. On the segment anteriorly to prolegs, the black tubercles edged white, form a continuous band around body, but smaller on the abdominal surface, also hairs on the abdominal tubercles. The general ground color is more ligneous than olivaceous as previously.



**Class I, HEXAPODA.**

**Order XI, ORTHOPTERA.**

**Order XII, DERMAPTERA.**

**REPORT ON THE ORTHOPTERA OF TRINIDAD,  
WEST INDIES.**

BY LAWRENCE BRUNER,  
LINCOLN, NEBRASKA.

Several years ago Mr. H. D. Chipman collected insects on the Island of Trinidad, British West Indies, and the writer secured a fairly complete set of the Orthoptera taken by him. Since that time a few additional forms have been obtained from G. E. Tryhane, of St. Anne's, Trinidad, and others from W. E. Broadway, of St. George's Grenada, who formerly collected on Trinidad. Altogether upwards of one hundred (112) species have thus been accumulated and form the basis of this paper.

Unlike others of the West Indies, this island is more closely related to the South American mainland in its fauna than they. Still a rather large number of new forms are described herewith, showing how very interesting is the study of island faunas, although but little removed from the mainland.

In 1892 Brunner von Wattenwyl and Prof. Joseph Redtenbacher published a paper on the Orthoptera of the Island of St. Vincent.\* A little more than a year later Brunner von Wattenwyl reported on the Orthoptera of Grenada.† In the former paper fifteen and in the latter nine new species were described. Quite recently Mr. Jas. A. G. Rehn published some "Notes on West Indian Orthoptera, with a List of the Species Known from the Island of Porto Rico."‡

In the first-mentioned paper 62, in the second 56 and in the last 59 species are listed. Aside from these faunal papers on the Orthop-

\* Proc. Zool. Soc. Lond., 1892, No. XV, pp. 196-222, Pls. xv-xvii.

† *Id.*, 1893, pp. 599-611, Pl. lii.

‡ Trans. Amer. Ent. Soc., XXIX, pp. 129-136 (1903).

tera of the West Indies, that on the Orthoptera of Cuba by Ignacio Bolivar with 145 species, are the only important papers we have.

It may be inferred from these facts, however, that each of the other islands of the group will furnish undescribed genera and species of closely related forms — those that have become so differentiated by long isolation under changed environment. Why not institute a systematic campaign for learning what all of these nearby islands contain in the way of insect life? This should by rights be done by American entomologists.

The arrangement of the non-saltatorial families in this paper is after Kirby's Synonymic Catalogue of the Orthoptera, Vol. I.

#### Order DERMAPTERA.

Although the members of this order are not Orthoptera as now recognized, they have been so long considered as such that it is thought best to include them here. At least five species are at hand, four of which seem to be new. They are the following :

##### 1. *Labia trinitatis*, new species.

A small, dark brown insect with a plain black head, pronotum, tegmina and wing sheaths, in which the disk of the abdomen above the forceps are reddish mahogany-colored. Body provided with a few stout bristles at sides of abdominal segments. Antennæ 10-13 jointed, dusky at base but becoming paler apically — the last two or three being obscure testaceous. Legs of normal length, the femora moderately stout; the latter dull black except apically where they are testaceous, the tibiae, except on basal half where they are infuscated and tarsi pale testaceous. Head wider than the pronotum, the clypeus, labium and other mouthparts dirty testaceous. Pronotum about as long as wide, the sides parallel, hind margin broadly rounded, the front edge a little angulate, the shoulders each provided with a conspicuous anteriorly projecting bristle; the disk forward moderately convex and showing a well-defined longitudinal sulcus. Tegmina a little more than twice as long as broad, their apices gently obliquely truncate, the surface smooth and shining. Wing-sheaths fully developed. Abdomen broadened in the middle, segments 2 and 3 showing slight traces of lateral folds; the last dorsal segment of male abdomen a little narrowed behind, its posterior edge straight and possessing a slight protuberance above the base of each prong of the forceps. The latter short, moderately robust at base where they are widely separated, their inner edge provided with a carina which ends in a small tooth, parallel for about one third their length, beyond this tooth tapering and evenly curved so that the tips cross on outer fourth. The arms of the female forceps also quite robust at base, but tapering quite rapidly, the inner edges touching and the apices gently crossing.

Length of body, ♂, 5.5 mm., ♀, 5.25 mm., of forceps, ♂, 1.1 mm., ♀, .85 mm.

*Habitat.* — Island of Trinidad, H. D. Chipman, collector, 1 ♂ and 1 ♀.

2. *Labia insularis*, new species.

A medium-sized, almost naked, smooth-bodied insect with from 14- to 16-jointed antennæ, and in which the wing-sheaths are largely testaceous in the center basally. Basal joint of antennæ and legs pale testaceous, the latter somewhat infuscated on the femora mesially and tibiæ basally. The labrum, together with labial and maxillary palpi, also somewhat pale-colored. Head dull black, the eyes large and prominent, rather coarsely granulate. Pronotum about as broad as long, the sides gently bowed; dull black, becoming brownish on the thinner lateral edges. Tegmina brown with a small testaceous longitudinal shoulder streak, about twice as long as their greatest width, their apices obliquely docked, the truncation gently concave. Wing-sheaths moderately large, reaching to the middle of third abdominal segment. Abdomen with the surface polished and only delicately punctate, the sides convex, broadest about the middle; the disk above dark mahogany brown, the base, apex and sides much darker, nearly or quite black; lower side testaceous basally becoming ferruginous apically. Forceps moderately stout, nearly straight and provided internally basally with a short flattened plate or projection the edges of which touch, beyond irregularly crenulate, scarcely toothed, the apices gently crossed.

Length of body ♀ (?), 8.5 mm; of forceps, 1.85 mm.

*Habitat.* — Island of Trinidad, West Indies, H. D. Chipman, collector.

In this insect the last dorsal segment of the abdomen is a trifle more than three and one half times as broad as long, coarsely punctulate, the sides gently rounded and converging posteriorly, the hind edge straight; middle of posterior portion lowered and provided with a central shallow depression.

3. *Labia modesta*, new species.

Very similar in general appearance to the preceding but differing from it in its somewhat smaller size, slightly more hairy body, the fewer antennal joints (13-14), the absence of the testaceous shoulder stripes on the tegmina, the smaller basal light spots of wing sheaths which in the present form are lateral rather than central — there being no border of the dark color externally as in *L. insularis*. Here the thin lateral edges of the gradually broadening pronotum are transparent. The disk of dorsal segments 4, 5, and 6 are brownish testaceous. Lower side along with legs pale testaceous, the latter, with the femora above strongly infuscated. Last dorsal segment smooth, about twice as wide as long, narrowing behind, the middle triangularly depressed between centers of bases of the two prongs of forceps and provided with a series of small, round, wart-like raised points. Forceps with their inner edges not laminate, not quite touching basally, evenly tapering, carinate above, crenulate on inner edge, the points crossing.

Length of body, ♂, 7 mm.; of forceps, 1.6 mm.

*Habitat.* — Island of Trinidad, West Indies, H. D. Chipman, collector, a single specimen.

4. *Labia pictipennis*, new species.

A large rather robust black species with ferruginous head, small black eyes and yellowish testaceous legs in which the tegmina and wing-sheaths are each provided with a large conspicuous spot of a bright yellowish orange color. The pronotum also more or less strongly bordered at sides with yellowish testaceous, sometimes its disk anteriorly likewise ferrugineo-testaceous. Antennæ 13- to 15-jointed, the two basal and one half of the third of the same color as head, the third and fourth joints from the apex are pale testaceous, remaining joints black. Whole insect sparsely clothed with rather long stiff hairs or bristles which are especially noticeable on the hind edges of femora and abdominal segments. Pronotum small, narrower than the head, about as long as wide, a little narrowed behind, the latter margin rounded; anterior half of disk roundly convex, with a well-marked longitudinal sulcus which becomes very pronounced on the depressed posterior half where it seems to issue from between two diverging, backward pointing carinæ. Tegmina about two and one half times as long as broad, their apices slightly obliquely docked; wing sheaths reaching a little beyond the apex of the second abdominal segment. Abdomen somewhat broadening at middle; last dorsal segment about twice as wide as long, a little narrowing behind, and provided above with faint longitudinal grooves or scratches. Anal forceps simple, short, heavy, triangular, their inner edges not quite touching at base, bluntly toothed or crenulate within, the tips crossing.

Length of body, ♂, 16-17 mm.; of forceps, 2.55 mm.

*Habitat.* — Trinidad Island, H. D. Chipman, collector, 2 ♂.

Joints 1 and 2 of tarsi are unusually hairy below.

5. *Spongiphora croceipennis* var. *parallela* Westwood.

*Forficula parallela* Westw., in Guer. Mag. Zoöl., VII, pl. 178 (1837).

*Forficula longiforvipata* Blanch, in d'Orbigny Voy. Am. Merid., VI, ii, Ins. p. 214, pl. 26, fig. 1 (1837-1843).

*Forficesila longissima* J. G. Wood, Ins. Abroad, p. 279, fig. 139 (1877).

*Spongiphora croceipennis parallela* Bormans, Tierr. 11 Lief., p. 56 (1900).

This species is represented by six specimens which were collected by H. D. Chipman. They belong to the variety 1b, according to A. de Bormans and H. Krauss (see Thierreich, 11 Lieferung, p. 56).

No doubt several other genera and species of the Forficulidæ are represented on the island.

Order ORTHOPTERA.

Family BLATTIDÆ.

6. *Anaplecta* sp.

There is a single specimen of this genus at hand that has not yet been determined. It was taken by Chipman at Port of Spain.

**7. *Chorisoneura mysteca* Sauss.?**

A second small cockroach that was taken at the same place by Mr. Chipman is referred here with some doubt.

**8. *Ischnoptera* sp.**

A single specimen about the size of, and bearing considerable resemblance to *I. uhleriana* Sauss., was taken near Port of Spain by Chipman.

**9. *Phyllodromia notata* Brunner?**

*Phyllodromia notata* Brunner, Proc. Zool. Soc. Lond., 1893, p. 602, pl. 52, figs. 1 a, b.

There are two specimens from near Port of Spain that appear to belong to Brunner's *P. notata*. They were also collected by Chipman.

**10. *Phyllodromia adpersicollis* Stål.**

*Blatta adpersicollis* Stål, Eugenie's Resa, Ins., p. 308 (1858); Sauss., Miss. Mex., Orthopt., p. 35, pl. 1, fig. 22 (1870).

*Phyllodromia adpersicollis* Brunn., Syst. Blatt., p. 107 (1865).

*Blatta nahua* Sauss., Rev. Zool., Ser. 2, XX, p. 355 (1868); Sauss. and Zehntn. Biol. Cent. Amer. Orth., I, p. 42, pl. 4, figs. 19-21 (1893).

This species is represented by six specimens, all of which were taken near Port of Spain by H. D. Chipman. It seems to be one of the few species which in time is destined to become widely spread in tropical countries.

**11. *Phyllodromia conspersa* Brunner.**

*Phyllodromia conspersa* Brunn., Syst. Blatt., p. 106, No. 24 (1865).

The collections received from Mr. H. D. Chipman contain two specimens of this species. They were collected on the Island of Trinidad.

**12. *Phyllodromia* sp.**

There are two specimens of a pale species of this genus which are a trifle smaller than the preceding. They were collected by Mr. Chipman and sent to me along with a number of other interesting Orthoptera taken near Port of Spain.

**13. *Phyllodromia infuscata*, new species.**

Still another and rather slender small species of this genus is represented by a single specimen taken by Chipman near Port of Spain on Trinidad Island. It seems to be new.

Dark piceous, with paler border to the pronotum in front and on the sides, and on the costal margin of the elytra as well. The pronotum is marked on the disk pos-

teriorly by a rather large triangular yellow spot that gives off a narrow forward projecting shoot in its middle. The head is dark, save about the base of antennæ and clypeus, where the color is testaceous. Venter pale, with a dusky vitta on each side of the middle. Cerci heavy, 10-jointed, the basal one testaceous, the rest dark. Length to tip of wings, 10.5 millimeters.

The type is in the writer's collection.

**14. *Phyllodromia* (?) *binotata*, new species.**

A single ♀ (?) specimen from H. D. Chipman is included in this genus with much doubt. It is dark colored and has the femora almost destitute of spines; the tegmina are a little longer than the abdomen and veined similarly to those of *Phyllodromia*. The cerci are rather incrassate, but acuminate, 9- or 10-jointed. The antennæ are coarse and the joints decidedly moniliform in appearance. The characteristic marking is two small pale triangular spots on the disk of the pronotum towards its hind margin.

Length, including wings, 9.5 millimeters.

**15. *Pseudophyllodromia* sp.**

Two specimens are placed in this genus, but no attempt has been made to determine the species. These insects are in the collection obtained from Chipman. They were taken near Port of Spain. In color they are dark piceous with pale legs, lateral borders of pronotum and costal margin of tegmina. In size they measure 8 millimeters, including tegmina and wings.

**16. *Nyctobora mexicana* Sauss.**

*Nyctobora mexicana* Sauss., Rev. et. Mag. Zoöl., XIV, p. 227 (1862).

*Nyctobora stygia* Walk., Cat. Blatt., Brit. Mus., p. 148, No. 9 (1868).

A single female specimen collected on the Island of Trinidad and sent to me by W. E. Broadway, of St. George's, Island of Grenada, is placed here.

**17. *Phoraspis* sp.**

There is a single somewhat mutilated specimen of *Phoraspis* before me from Trinidad Island. It was taken by W. E. Broadway, from whom it was obtained along with some other miscellaneous orthopterous insects. This insect is somewhat similar to *P. pantherina*, but differs from it in having the sides of the pronotum and anterior lateral margins of the tegmina testaceous and evenly conspersed with black.

**18. *Epilampra cribrosa* Burmeister ?**

1 ♂ and 3 ♀♀ from H. D. Chipman, who collected them in the woods near Port of Spain.



19. *Epilampra brevis* Brunner?

There are a like number of a second species from the same locality and person which seem to belong to Brunner's *E. brevis*.

20. *Blatta (Stylopiga) meridionalis*, new species.

A medium-sized species of glossy black color in which both sexes are entirely apterous, not showing even the slightest signs of the aborted lateral tegmina as figured for *insularis*. The distinguishing characteristic of the species, however, is the dirty white palpi, which are very conspicuous in comparison with the otherwise general pitchy black color of the insect.

In size this cockroach is somewhat smaller than *orientalis*. It is also more compactly built and darker colored, while its entire body is smooth and impunctate. The only variation from the general black color, except the palpi as indicated above, are the antennæ on their apical half, the legs on their coxæ, the front edge of the femora, the knees and parts of the tarsi which incline to rufo-piceous. The legs are quite strongly spined. The spines on the posterior edge of the anterior femora both above and below are much smaller than those on the other legs, the number fourteen or fifteen in each row. The middle and hind pairs have this part provided with a series of seven both above and below. The apical dorsal segment or supraanal plate of the ♀ abdomen is triangular with its tip evenly rounded, while the last ventral is prow-shaped and pointed. In the ♂ the upper plate is slightly transverse with rounded lateral edges and a slight longitudinal median furrow which gives to it a somewhat bilobed appearance. The cerci are moderately long and robust in both sexes.

Length of body. ♂, 16, ♀, 23; of pronotum, ♂, 4, ♀, 5.40; greatest width of pronotum ♂, 6, ♀, 7 millimeters.

*Habitat*. — Island of Trinidad, 1 ♂, 1 ♀ (H. D. Chipman, collector).

The types are in the author's collection.

21. *Periplaneta americana* Linneus.

This cosmopolitan species is represented by several specimens. It was also collected by Mr. Chipman, presumably in Port of Spain.

22. *Periplaneta australasiæ* Fabricius.

Likewise from Port of Spain. Taken by Chipman. Like the preceding a cosmopolitan insect, but more especially confined to the warmer parts that are visited by ocean shipping.

23. *Leucophæa surinamensis* Linneus.

There are also several specimens of the above-named cosmopolitan roach. They come from Mr. Chipman and were taken in the interior of the Island of Trinidad.

**24. *Panchlora virescens* Thunberg.**

*Blatta virescens* Thunb., Mem. Acad. St. Petersburg, N, p. 278 (1826); Serv., Ins. Orthoptera, p. 101 (1839).

*Blatta* (*Panchlora*) *virescens* Guer., in Ramon de la Sagra, Hist. Cuba, Ins., p. 344 (1857).

Two female specimens of the genus without the black dots on the elytra are placed here. Collected by H. D. Chipman.

**25. *Panchlora viridis* Burmeister.**

*Panchlora viridis* Burm., Handb. Ent., ii, p. 506 (1838).

*Panchlora poeyi* Sauss., Rev. et Mag. de Zool., 1862, p. 230; Ib., Mem. Blatt., p. 194 (♂).

A single male from Chipman taken near Port of Spain seems to agree perfectly with the description of *viridis*. It also lacks the dot on the tegmina.

**26. *Panchlora peruana* Sauss.**

This, the most abundant as well as widely distributed species of the genus, is represented by a pair. They were also taken by Mr. Chipman in the forests on the Island of Trinidad. It is the insect that is most frequently carried in bunches of bananas to various parts of the United States. One or two of the other species are likewise thus carried.

**27. *Archimandrita marmorata* Stoll?**

*Blatta marmorata* Stoll, Spectres, Blattes, p. 3, pl. 2d, fig. 5 (1813).

*Blabera marmorata* Sauss., Mem. Mex. Blatt., p. 249 (1864); Brunn., Syst. Blatt., p. 378 (1865).

*Archimandrita marmorata* Sauss., & Zehntn. Biol. Cent. Amer., 1, p. 116 (1894).

A single mature nymph is placed here with some doubt. It certainly does not belong to the next genus. Collected by W. E. Broadway.

**28. *Blabera stollii* Brunner.**

*Blatta gigantea* Stoll, Rep. Spectres, etc., p. 2, Pl. 1d, fig. 1 (1813).

*Blabera stollii* Brunn., Syst. Blatt., p. 374 (1865).

A single specimen of this giant cockroach was sent to me by W. E. Broadway who collected it on the Island of Trinidad.

**29. *Blabera fusca* Brunner.**

*Blabera fusca* Brunn., Syst. Blatt., p. 376 (1865).

A single female specimen from near Port of Spain is placed here. It was collected by H. D. Chipman.

30. **Blabera cubensis** Saussure.

*Blabera cubensis* Sauss., Rev. et Mag. de Zool., Ser. 2, XVI, p. 347 (1864).

*Blabera subspurcata* Walk., Cat. Blatt. Brit. Mus., p. 4 (1864).

This species is represented by but a single specimen, a female, that was collected at the same time and place with the preceding by Chipman.

These large blattids are not plentiful although there are numerous forms, many of which are rather widely distributed. They usually come into collections a specimen at a time.

31. **Latindia castanea** Brunner.

*Latindia castanea* Brun., Proc. Zool. Soc. Lond., 1893, p. 604.

A single individual from near Port of Spain, H. D. Chipman collector.

## Family MANTIDÆ.

32. **Acontista multicolor** Saussure.

*Acontista multicolor* Sauss., Mitth. Schweiz. Ent. Ges. III, p. 229 (1870).

Two undoubted females and four possible males of this species are before me as I write. They were taken by H. D. Chipman.

33. **Tithrone roseipennis** Saussure.

*Acontista roseipennis* Sauss., Mitth., Schweiz. Ent. Ges. III, 229 (1870).

*Tithrone roseipennis*, Sauss. & Zehntn., Vol. I, p. 139 (1894).

Three specimens, 1 ♂ and 2 ♀♀, are at hand. H. D. Chipman, collector.

34. **Liturgousa cayennensis** Saussure.

Two females of this insect are among the material received from H. D. Chipman. They come from the interior of the island.

35. **Mionyx surinamus** Saussure.

*Thespis surinama* Sauss., Mitth., Schweiz. Ent. Ges. III, p. 70 (1869).

*Mionia surinama* Stål., Bihang. Svenska Akad., iv, pp. 63, 64 (1877).

One specimen, a male, was taken along with the preceding by Mr. Chipman.

36. **Acanthops** sp.

W. E. Broadway sent me two specimens of an *Acanthops* which he collected on the Island of Trinidad several years ago. They are dead-leaf brown and about the size and form of *A. godmani* Sauss. Their much darker color, however, seems to indicate their distinctness. It is hardly possible that this is an undescribed species.

37. *Oxyops rubicunda* Stoll.

*Mantis rubicunda* Stoll, Repts. Spectres, Mantes, p. 73, Pl. 25, fig. 26 (1813).

*Stagmatoptera diluta*, ♂ (nec ♀), Sauss., Mem. Mex. Mant., p. 87, pl. 1, fig. 6 (1871).

A single specimen, a female, is at hand. It was collected and sent to me from Port of Spain by H. D. Chipman.

38. *Parastagmatoptera vitrepennis*, new species.

Most closely related to *P. unipuncta* (Burm.) and *P. tessellata* Sauss. et Zehnt., from both of which it differs in its somewhat smaller size, slenderer form (?) and shorter tegmina. The prothorax is almost without the marginal dentation of *unipuncta*, while the tegmina are considerably shorter than the wings. The marginal field of the former is green and opaque on the basal half.

Lower inner apical third of coxæ black. Prothorax, coxæ and femora, together with antennæ and marginal border of folded tegmina and outer portion wings, testaceo ferruginous; the head and tibiae with a greenish tinge. Greater portion of the tegmina and wings vitreous, very faintly greenish tinged.

Length of body, ♂, 34, of pronotum, 12, width of its dilation, 2.15, length of tegmina, 24, width of tegmina, 6, of the marginal field, 1.4 mm.

*Habitat*. — A single male, Trinidad, W. I. (H. D. Chipman, Coll.) The type is in the author's collection.

39. *Stagmatoptera præcaria* Linneus.

*Gryllus* (*Mantis*) *præcarius* Linn., Syst. Nat. (ed. X), I, p. 426, No. 7 (1758).

*Mantis præcaria* DeGeer, Mem. Ins., III, pp. 406, 407, No. 3, pl. 37, figs. 4, 8, 9 (1773).

And a number of synonyms.

*Habitat*. — W. E. Broadway has sent me 1 ♂ and 2 ♀♀ of this common large South American mantis. It was collected on the Island of Trinidad.

## Family PHASMIDÆ.

40. *Clonistria linearis* Drury?

*Mantis linearis* Dru., Illustr. Exot. Ent. I, pl. 50, fig. 3 (1773).

*Bacteria linearis* Gray, Syn. Phasm., p. 17 (1835); Westw. Cat. Phasm. Brit. Mus., p. 24, No. 64 (1859).

(?) *Clonistria linearis* Rehn, Proc. Acad. Nat. Sci. Philad., 1904, p. 60.

*Pseudobacteria longiceps* Kby., Ann. Nat. Hist. (6), III, p. 503 (1889).

The collections contain a number of immature Phasmids from Trinidad, while only two fully matured specimens are at hand. A male may be the *linearis* of Drury. If so, a female taken at the same time may prove to be its female. It is of a very dark gray-brown

color, rather robust in form, somewhat granulose, and provided with 3 longitudinal carinæ on the dorsum of thorax and abdomen, on the latter the median one is looped or linked so as to appear as a chain, a link to a segment. The head is provided on the occiput, with two fairly prominent short spines or horns between and a little back of the eyes. The legs are a trifle more robust and shorter than those of the male, while its antennæ are also much shorter. Its length is 50 mm.

A number of younger specimens show a great variation in color. Some are green, others testaceous and still others ferruginous.

41. *Acanthoclonia histrinus* Westwood.

*Ceroys histrinus* Westw., Cat. Phasm. Brit. Mus., p. 60, No. 156, pl. 1, fig. 5.

A single female specimen by H. D. Chipman on Trinidad.

Family ACRIDIDÆ.

Subfamily TETTIGINÆ.

42. *Amorphopus notabilis* Serville.

*Amorphopus notabilis* Serv., Hist. Nat. Ins. Orthopt., p. 757, pl. 13, fig. 2 (1839).

There are two specimens, ♂, and ♀, in the collection made by H. D. Chipman on the Island of Trinidad. One of these was examined by Dr. J. L. Hancock.

43. *Amorphopus antennatus* Bolivar.

*Amorphopus antennatus* Bol., Essai des Tettig., p. 77, pl. 11, figs. 19, 19a-b (1887).

Of this species the collections contain nine specimens. They were collected by Messrs. Chipman and Broadway. It is the common species of the genus in Central America, the West Indies and northern South America.

44. *Tettix gracilis*, new species

A small and very slender species in which the median carina of the pronotum is slightly arched just back of its anterior margin, less prominent elsewhere but quite plain throughout. The entire insect is rather finely and sharply granular. Vertex about as wide as the diameter of the prominent eyes, with a strong median carina, but little advanced in front of the eyes; frontal costa broad and very prominent between the antennæ.

Length of body, ♂, 6, of pronotum, 9.5, of hind femora, 4 mm.

*Habitat.* — Trinidad, West Indies, 2 males. H. D. Chipman.

These specimens were examined by Dr. Hancock and pronounced not typical, but still evidently belonging to the genus *Tettix*.

45. *Allotettix chipmani*, new species.

A very graceful species with unusually elongated pronotum and wings. Eyes rather prominent, the vertex about as wide as one of the eyes, only a trifle projecting beyond their anterior edge, broadly sulcate and provided with a strong median carina which reaches back nearly to the front edge of the pronotum. antero lateral edges rounded and furnished with prominent carinae. Face rounded and furnished with prominent carinae. Face viewed in profile rather oblique, strongly sinuate, the frontal costa between the antennae profound and deeply sulcate, gently widening below. Antennae arising just below the eyes, slender. Ocelli located about the middle of inner edge of eyes, of ordinary size. Pronotum narrow, the process greatly attenuate and surpassing the tips of hind femora by their own length; the median carina percurrent, a little prominent in advance of the humeral angles just back of the anterior margin; the latter squarely truncate; disk of pronotum both rugose and finely granulate, the rugae, particularly in widest portion, inclining to form longitudinal or diagonal carinae; lower posterior angles rounded. Tegmina normal. Anterior and middle femora not clypeate, about normal, the hind femora a little elongate. First and third joints of hind tarsi subequal.

General color dull black or brown, conspersed with testaceous, much paler beneath. Tarsal joints black-tipped. Wings dusky apically, and with the disk dark purplish pearl color.

Length of body, ♂, 7 mm., ♀, 9 mm.; of pronotum, ♂, 12 mm., ♀, 14-15 mm.; of hind femora, ♂, 5 mm., ♀, 6-6.25 mm.

*Habitat.* — Island of Trinidad and adjoining portions of British Guiana, H. D. Chipman and R. J. Crew, collectors, many specimens of both sexes (Coll. L. Bruner).

46. *Micronotus quadriundulatus* Redtenbacher.

*Tettix quadriundulatus* Redt., Proc. Zool. Soc. Lond., 1892, p. 208, Pl. XVI, fig. 10.

This insect is represented by several specimens of both sexes. H. D. Chipman, collector.

An examination of this material seems to indicate that *quadriundulatus* is either very variable or else there are two or more closely related species found upon the island of Trinidad. In the first examination a smoother form with but three undulations of the pronotum was set aside under the name *Micronotus hancocki*. Another and later examination reveals a third form in which there are five such undulations. To definitely settle this matter a much larger series of specimens is necessary.

Two or three additional forms appear among the excellent collection of these interesting little locusts that were received from Mr. Chipman, but they will be reported on at a later date after they have



been critically studied by Dr. J. L. Hancock, who is making a special study of the subfamily.

47. *Tettigidea trinitatis*, new species.

Characterized by its rather slender form, small size, spicate anterior edge and evenly granulate surface of pronotum above, the long wings and pronotal process, and by the pale lower half of body and anterior and middle legs of male.

Pronotum with the antero-dorsal edge strongly angulate and produced upon the occiput in an acute forward projecting spine that reaches as far as the middle of upper edges of the rather large and prominent eyes. Vertex rather narrow, a little more than half the diameter of one of the eyes, projecting slightly in advance of them. Frontal costa narrow, not prominent, deeply sulcate. Antennæ moderately long, pale basally in the males, more or less annulate in the females. Face not greatly oblique. Tegmina narrow, the lower apical edge broadly rounded, the upper apical edge angulate, crossed just before the apex by an oblique narrow pale patch. Hind femora robust in the female, usually provided with a median broad pale band. General color varying from pale to obscure brown, the legs and abdomen of the female more or less conspersed and banded with testaceous. Head of male below the base of antennæ and eyes uniformly dirty white; lower lateral edges of pronotum, all of under side, front and middle legs, base of hind femora, tips of hind tibiæ, the tarsi and most of abdomen also of this color.

Length of body, ♂, 6.75-7 mm., ♀, 9 mm.; of pronotum, ♂, 8 mm., ♀, 9.5 mm.; of hind femora, ♂, 4.60-4.75, ♀, 5.5-6 mm.

*Habitat.*—2 ♂ and 6 ♀, Trinidad Island, H. D. Chipman, collector (Coll. L. Bruner).

48. *Tettigidea imperfecta*, new species.

A small dark-colored, slender-bodied insect with greatly abbreviated wings and small narrow apically light blotched tegmina, in which the process of pronotum scarcely reaches the tip of the abdomen. Very finely granulate and without the short lateral longitudinal ridges so commonly met with on the disk of the pronotum in various species of the genus; median carina prominent throughout, the disk anteriorly gently tectate; antero-dorsal edge decidedly angulate but not cuspidate in the single ♀ now before the writer, though a ♂ nymph of what is apparently the same species has the anteriorly projecting spine strongly developed. Eyes of moderate size; width of vertex a trifle more than one half of the longest diameter of eyes, slightly advanced in front, broadly and shallowly sulcate and without a median carina save at the extreme anterior edge. Face somewhat oblique and sinuate when viewed from the side; frontal costa quite prominent between the antennæ, sulcate, its greatest width slightly more than that of basal antennal joint. Posterior femora robust and uncommonly smooth even for the genus. Valves of the ovipositor short and slender.

General color above uniform dark brown, almost black, the lower side, together with legs, varied with dirty testaceous; the anterior and middle tibiæ annulate with black—all the feet black-tipped.

Length of body, ♀, 9 mm.; of pronotum, 8 mm.; of hind femora, 5.5 mm.

*Habitat.* — 1 ♀ and perhaps also a ♂ nymph, Island of Trinidad, West Indies, collected by H. D. Chipman (Coll. L. Bruner.)

49 *Paurotarsus rugosus*, new species.

Rather robust and with the surface of pronotum and head above more than commonly rugose, the rugæ on disk of former appearing as numerous blunt longitudinal ridges of varying length. The sexes not greatly unequal in size.

Head short and broad; eyes rather small and separated above by a space a little wider than their greatest diameter; vertex broadly convex, very rough, notched laterally at middle of eyes, considerably advanced in front, provided in the middle with a prominent carina, the antero-lateral edges rounded and provided with well-marked carinæ, which, however, do not reach the middle in front. Frontal costa very prominent and broad, the lateral edges heavy and rather profoundly divergent below, sulcate from the extreme vertex. Lateral facial carinæ strong, arcuate, extending from the base of the antennæ to lateral edges of base of clypeus. Lateral ocelli very prominent, situated above the middle of inner edges of eyes and against the sides of frontal costa. Antennæ filiform, 18- or 19-jointed, about reaching the base of tegmina, situated a trifle above a line drawn from the lower edge of eyes, the basal joint rather large. Posterior lateral angle of pronotum not at all produced, the lower and posterior edges meeting in a right-angle. Antero-dorsal process of pronotum not advanced upon the occiput; in both sexes extending slightly beyond the tip of the hind femora, the latter slightly surpassing the apex of abdomen; tip of male abdomen long and tapering, apex of last ventral segment rather deeply notched; valves of ovipositor long and wedge-shaped, rather strongly serrate. Hind femora large and course, somewhat longer in proportion to the size of the insect than usual in members of the Tettigineæ.

General color dull brownish black, more or less varied on pronotum above and on the legs with dirty ferrugineo-testaceous — the venter irregularly mottled with testaceous, the valves of ovipositor pale with darker apex.

Length of body, ♂, 11 mm., ♀, 13 mm.; of pronotum, ♂ 11 mm., ♀, 12.5 mm.; of hind femora, ♂, 6.5 mm., ♀, 7.25 mm.

*Habitat.* — 1 ♂ and 1 ♀, Island of Trinidad, West Indies, H. D., Chipman, collector (Coll. L. Bruner).

Subfamily EUTRYXALINÆ.

50. *Eumastax* sp.

A single nymph of a species of *Eumastax* was collected and sent to me by G. E. Tryhane, of St. Anne's. It seems to be most closely related to the *E. plebja* Gerst., but in the absence of mature specimens cannot be definitely determined.

Subfamily TRYXALINÆ.

51. *Amblytropidia trinitatis* Bruner.

*Amblytropidia trinitatis* Bruner, Biol. Cent. Amer. Orthopt., 11, p. 65 (1924).

This species is represented by seven males and three females collected by Mr. H. D. Chipman near Port of Spain. It also occurs on the main land at Demerara, British Guiana.

**52. *Orphullela punctata* DeGeer.**

*Acrydium punctatum* DeG., Mem. Hist. Ins., III, p. 503, pl. 42, fig. 12 (1773).

*Orphula punctata* Stal, Recens. Orthopt., I, pp. 106, 107 (1873).

*Orphula* (*Orphullela*) *punctata* Gig.-Tos, Boll. Mus. Zool. Torino, IX, No. 184, p. 12 (1894).

Several specimens of both sexes. They were taken at various localities on the island by all the collectors.

While the genus contains numerous representatives in North and Middle America, there is but little doubt as to the identity of De-Geer's species.

**53. *Orphullela chipmani*, new species.**

A small species of variable color with the lateral carinæ of the pronotum parallel in advance of the hind transverse sulcus, and with unusually narrow tegmina.

Occiput somewhat elongate, the eyes large but not prominent, the fastigium slightly acuminate even in the female, shallowly sulcate; lateral foveolæ small, linear, scarcely sulcate, frontal costa prominent only above, very shallowly sulcate and with the sides gently divergent below. Antennæ slender, filiform, short, in the male only a trifle exceeding, in the female somewhat less than the combined length of head and pronotum together. Pronotum a little expanding behind, the two lobes equal in length, the lateral carinæ parallel in advance of the last or principal sulcus. Tegmina narrow, the discoidal area in the ♀ containing but a single row of cells, just about reaching the apex of abdomen and hind femora in the female, equal to the latter but longer than the former in the male. Hind femora with basal half robust, apical half slender, immaculate.

Color variable, but usually green or testaceous on occiput, disc of pronotum and dorsal field of tegmina. Sides of head, back of eyes, upper half of sides of pronotum and pleuræ, and disk and costal field of tegmina dark fuscous; face, lower portion of cheeks, sides of pronotum, pleuræ, hind femora, abdomen and under side pale (male). In the female the fuscous band back of the eyes is much narrower and confined to the upper edge of the sides of pronotum and the tegmina are much paler and show traces of maculation. The wings are fuliginous or fuscous, darkest apically. Hind femora somewhat obscure on the knees, and the hind tibiæ along with all the tarsi also infuscated.

Length of body, ♂, 12-13, ♀, 18; of pronotum, ♂, 2.2, ♀, 2.9; of tegmina, ♂, 9.5-10, ♀, 12-13; of hind femora, ♂, 7.5 ♀, 9.5 mm.

*Habitat.* — Interior of Island of Trinidad, several specimens of both sexes. H. D. Chipman, collector.

**54. *Orphullela insularis*, new species.**

Specimens of what appear to be a third species of *Orphullela* are among the collections received from both Mr. Chipman and Mr. Tryhane. They are about the size of the preceding from which they differ in their slightly more robust form, the shorter and somewhat flattened antennæ, the smaller eyes, the more obtuse fastigium of the vertex, the gently arcuate lateral carinæ of the pronotum, the slightly broader tegmina and more robust hind femora. In color they vary from a pale brunneo-testaceous to a dull brown. Some female specimens show the usual dusky pronotal and pleural markings, while others are without them. Both the males and the females have the tegmina quite evenly maculate with pale to darker fuscous patches similar to those so characteristic in the considerably larger *O. punctata* DeGeer. The hind femora of the males have prominent traces of a fuscous band across the upper edge, while the lower outer carina is adorned with 4 to 6 elongate fuscous maculations. Anterior and middle tibiae fasciate with fuscous, the hind tibiae somewhat infuscate. Sides of basal abdominal segments piceous.

Length of body, ♂, 13.5, ♀, 18; of pronotum, ♂, 2.9, ♀, 3.25; of tegmina, ♂, 12, ♀, 13.5; of hind femora. ♂, 8, ♀, 9.5-10 mm.

*Habitat*. — Trinidad, West Indies.

This insect will run close to *meridionalis* Bruner, in the synoptic table of the genus as given in the Biologia Centrali Americana, but by comparison with that species shows a number of differences.

Subfamily ACRIDINÆ.

**55. *Prionolopha serrata* Linnaeus.**

There are at hand two males and a female of this widely distributed South American locust. They were received from H. D. Chipman, who collected them on the Island of Trinidad.

**56. *Tropidacris dux* Drury.**

One male and two females (H. D. Chipman), a pair (W. E. Broadway), and female (G. E. Tryhane).

For the synonymy of this handsome large locust see Scudder's article entitled "A Study of the Giant Lobe-crested Grasshoppers of South and Central America."

**57. *Prionacris* ? sp.**

Mr. G. E. Tryhane sent to me among other interesting Orthoptera taken on the Island of Trinidad a young nymph which seems to belong to the genus *Prionacris*. It is black, marked with dashes of yellow. There are three such markings, which are oblique, on each side of the disk of the pronotum, and the hind femora are thrice banded with the same color.

## Group LEPTYSMINI and allies.

From the collections at hand it would appear that at least one half of the American genera of Acridians with the dilated and acute-edged hind tibiæ are represented on the Island of Trinidad. This being true, and because there is likewise a new genus now to be added to the group, a synoptic table of the genera is herewith given:

## TABLE FOR THE SEPARATION OF THE AMERICAN GENERA OF LEPTYSMA AND ALLIES.\*

\* This table is a modification of Giglio-Tos' (Bolletino dei Musei di Zoologia ed Anatomia comparata della R. Università di Torino, No. 311, XIII, pp. 40-50, 1898).

*A.* Posterior tibiæ slightly expanding apically, the margins acute.

*b.* Mesosternal lobes with their inner edges nearly straight and touching for most of their length. Elytra acuminate.

*c.* Fastigium of the vertex as long as, or longer than, the longest diameter of eyes.

*d.* Fastigium of the vertex furnished with decided longitudinal grooves or sulci.

*e.* With but a single profound sulcus ..... **Leptysma** Stal.

*ee.* With four such narrow but well-defined sulci.

..... **Leptysmina** G. Tos.

*dd.* Fastigium of the vertex without definite longitudinal sulci.

..... **Cylindrotettix** n. gen.

*cc.* Fastigium of the vertex shorter than the eyes ..... **Arnilia** Stal.

*bb.* Mesosternal lobes more or less distant. Tegmina subacuminate or rounded at apex.

*c.* Posterior margin of the pronotum rounded.

*d.* Tubercle of the prosternum transverse, broad, the apex truncate.

..... **Oxybleptella** G. Tos.

*dd.* Tubercle of the pronotum conical, more or less acute.

*e.* Body very graceful or slender. The front strongly oblique. Head much exserted, conical. Antennæ distinctly ensiform. Eyes rather elongate, viewed from above strongly convergent, meeting at an acute angle. Pronotum distinctly dilated posteriorly, the lower edge of sides straight, oblique. Tegmina somewhat dilated toward apex ..... **Inusia** G. Tos.

*ee.* Body heavier. The front less oblique. Head only gently exserted, not conical. Antennæ filiform, or a little subensiform. Eyes not at all or but little elongated, when viewed from above slightly convergent, forming an obtuse angle. Pronotum not or but little dilated posteriorly; the lower edge of sides straight on posterior half, emarginate on anterior half. Tegmina narrow towards apex.

- f.* Pronotum cylindrical, the dorsum straight viewed laterally, the metazona not elevated. Frontal costa below the ocellus and the lateral carinæ of the face subobsolete. Eyes rather oblique, less prominent.....**Stenopola** Stal.
- ff.* Pronotum gently dilated posteriorly, the dorsum when viewed laterally sinuate, subselliform, the metazona gently elevated, the humeral angles rather distinct. Frontal costa and lateral carinæ of the face distinct. Eyes less oblique and strongly prominent..**Henia** G. Tos.
- cc.* Posterior margin of the pronotum obtusangulate.
- d.* Angle of the posterior margin of the pronotum entire, not incised. Tegmina greatly surpassing the hind femora.
- c.* Frontal costa rather prominent between the antennæ, subdilated. Eyes rather strongly convergent and somewhat remote from the front edge of the pronotum. Tegmina with their apices subacuminate ..... **Cornops** Scudd.
- ee.* Frontal costa less prominent between the antennæ, not dilated. Eyes less convergent, not distant from the front edge of the pronotum. Tegmina with their apices distinctly rounded. **Paracornops** G. Tos.
- dd.* Angle of the posterior margin of the pronotum greatly incised. Tegmina not surpassing the hind femora.
- c.* Frontal costa percurrent, sulcate throughout. Fastigium of vertex subhorizontal.....**Mastusia** Stal.
- ee.* Frontal costa subobsolete below the ocellus, not sulcate. Fastigium declivant.....**Tetratænia** Stal.
- A.A.* Posterior tibiæ not or but little expanded apically, the margins rounded. **Copiocera** Burm.

# 58. *Leptysma minima*, new species.

Cylindrical, slender, small. General color (alcoholic) pale ferrugineo-testaceous, without any signs of the usual paler or darker elongate lateral lines.

Head large, considerably longer and a little wider than the front edge of the pronotum. Eyes large, oblique, not prominent, a little longer than that portion of the cheeks below them. The fastigium separated from the very narrow vertex by a rather deep notch, suddenly expanded so as to become even with the outer front edge of the eyes and a little longer than one of them, roundly angulate in front and provided with a broad and rather profound median sulcus. Antennæ as long as the head and pronotum combined, broadly ensiform. Pronotum pinched laterally in the middle, a little broader in front than behind, the surface somewhat punctate, especially on the hind lobe, which is much shorter than the anterior one. Tegmina long, narrow, lanceolate, with comparatively few veins, extending somewhat beyond the apex of the abdomen. Hind femora slender and weak, much shorter than the abdomen. Hind tibiæ with 16 spines in outer row and 25 in inner row.

Length of body, ♀, 29; of head, 6; of pronotum, 3.5; of hind femora, 10; of tegmina 23 mm.

*Habitat.* — Island of Trinidad, W. E. Broadway, collector (Coll. L. Bruner).



This insect is nearest to *L. gracilis* Bruner, a species that comes from Brazil and which has recently been recognized as distinct from *L. filiformis* Serv. It has been described in the Proceedings of the U. S. National Museum in connection with other forms from South America.

Genus **CYLINDROTETTIX** new.

Aside from the characters mentioned in the foregoing table a few additional characters should be given as follows: Head long and pointed; the eyes very oblique, not prominent, about as far apart above as the width of the second antennal joint; fastigium equally as long as the eyes, its upper side rounded, its apex as in *Leptysmina*, antennæ strongly ensiform, as long as the head and pronotum together, frontal costa prominent and sulcate above the ocellus to a point slightly in advance of the apex of fastigium where it suddenly narrows to a mere ridge, below the ocellus faint. Pronotum a trifle longer than the occiput, its surface strongly punctulate, all three transverse sulci well-defined, the median carina present but not prominent except on the hind lobe; front and hind margins rounded above, the former with the middle squarely docked. Prosternal spine of moderate size and enlarged apically, gently directed to the rear. Legs weak, slender and short; hind femora reaching but little beyond the basal two thirds of abdomen; hind tibiæ considerably shorter than the femora, with nine or ten weak spines in outer row. Tegmina long and slender, reaching considerably beyond the tip of the abdomen. Valves of the ovipositor rather short and tapering rapidly towards the moderately hooked apices; the upper ones provided above basally with a single prominent black tubercle, the lower pair each with three fairly large tubercles.

59. *Cylindrotettix insularis*, new species.

General color grass-green with a ferruginous tinge to thorax above and tegmina. The usual greenish-white line beginning at lower posterior edge of eyes and passing back to lower edge of pronotum and across pleure to base of hind femora. Face apple-green; antennæ ferruginous, eyes æneous; anterior and middle legs green; lower side pale greenish yellow.

♀. Length of body, 38-42; of antennæ, 14; of fastigium, 3; of pronotum, 5.75; of tegmina, 33-36; of hind femora, 15.5 mm.

*Habitat.* — 2 ♀♀, Trinidad Island, West Indies, H. D. Chipman, collector (Coll. L. Bruner).

60. *Arnilia cylindrodes* Stål?

There is a single male specimen of *Arnilia* in the collection from Trinidad which is determined with some doubt as Stål's *Opsomala cylindrodes*. Although it agrees well with a female specimen taken by the writer at Victoria, Brazil, and another from Demerara, British Guiana, a careful comparison of the structure of the last ventral segment of the male abdomen in specimens from Florida, Mexico and South America, shows this to vary much. Our North American

(Southeastern U. S.) specimens are certainly distinct from those coming from South America. These insects will be more carefully examined later and the results published in a special paper now in course of preparation.

**61. *Inusia chimpani*, new species.**

Very similar to *I. gracillima* G.-Tos, but differing from it in its somewhat larger size and darker color.

Head, except on the sides back of the eyes, strongly punctate. Eyes prominent, separated above by a very narrow space which is sulcate; the fastigium somewhat ascending, elongate, triangular, shorter than the eyes, rugosely punctate or verrucose, carinate anteriorly. Face viewed in profile broadly concave, the median costa sulcate and coarsely punctate; lateral carinae sharp. Antennae distinctly but not broadly ensiform, nearly as long as the hind femora. Pronotum somewhat dilated on the posterior lobe, punctate, more strongly so on the hind lobe. Lower lateral edges in the female straight, in the male a very little sinuate. Tegmina considerably surpassing both the abdomen and hind femora, the extreme apex subacuminate. Hind femora just reaching (♀) or considerably surpassing (♂) the apex of the abdomen, their genicular lobes somewhat acuminate. Hind tibiae only gently dilated apically, provided externally with seven and internally with nine spines. Last ventral segment of male abdomen short and rather blunt, the apex entire. Valves of ovipositor short and slender.

General color above dark fusco-ferruginous, below greenish testaceous, separated on the sides by a narrow, deep black band which reaches from the hind edge of the eyes to just above the base of the hind femora. The latter greenish, their apices with a ferruginous tinge and marked on their inner genæ with black; hind tibiae pale glaucous, infuscated basally. Dorsum of abdomen fuscous. Antennae dark ferruginous. Wings infuscated.

Length of body, ♂, 20, ♀, 25; of pronotum, ♂, 3.9, ♀, 4.5; of tegmina, ♂, 20, ♀, 24; of hind femora, ♂, 11.5, ♀, 14 mm.

*Habitat.* — Island of Trinidad, six males and one female, H. D. Chipman, collector, 1 ♂, W. E. Broadway (Coll. L. Bruner).

This insect occurs in British Guiana as well. Still another species of the genus is found in portions of Mexico and Central America.

**62. *Stenopola limbatipennis* Stål?**

Three males and one female from the interior of the island are referred here with some doubt. They were collected by H. D. Chipman.

**63. *Cornops bivittatum* Scudder?**

Another species of these aquatic or subaquatic Arctridians, which was taken by Mr. Chipman is represented by three specimens 1 ♂ and 2 ♀♀. It is doubtfully referred to Scudder's *Cornops bivittatum* until it can be studied more carefully.

**64. *Copiocera erythrogastra* Perty.**

*Xiphocera erythrogastra* Perty., Delect. Anim. Artic., p. 122, pl. 24, fig. 2 (1830).

*Copiocera erythrogastra* Brum., Handb. Ent., II, p. 612 (1838).

?*Gryllus euceros* Marschall, Ann. Wien. Mus., 1836, p. 206, pl. 18, fig. 8 (1836).

A single female of this species was sent to me by Mr. H. D. Chipman, who took it on Trinidad.

**65. *Vilerna æneo-oculata* DeGeer.**

*Acridium æneo-oculatum* DeG., Mem. III, p. 502, pl. 42, fig. 11 (1773).

*Vilerna ænio-oculata* Stål, Recens. Orthopt., I, p. 71 (1873).

*Acridium sanguinipes* Serv., Hist. Orthopt., p. 670 (1839).

A number of specimens of both sexes taken by H. D. Chipman, on Trinidad. I also have specimens from British Guiana.

**66. *Sitalces trinitatis*, new species.**

Rather above the medium in size, a little robust. Sides of head, lower edges of pronotum and pleura to base of middle legs marked with a white line. The male with a broad pale dorsal band and green legs. The female without the pale dorsal band, the legs ferrugineo-testaceous, heavily conspersed with fuscous. Hind tibiæ deep glaucous.

Head a little wider than the front edge of the pronotum, eyes large and prominent, æneous; vertex as broad as the first (♀) or the second (♂) antennal joint, the fastigium slightly depressed, blunt; lateral foveolæ subquadrate, about the size and just in front of the ocelli; frontal costa prominent above, of nearly equal width, continuous and gently sulcate to the clypeus, coarsely punctate above the sulcus. Pronotum without lateral carinæ, coarsely punctate, a little expanding on the posterior lobe which is only half as long as the anterior one, the transverse sulci rather profound, anterior edge truncate, the posterior edge of disk a little emarginate, lower edges strongly sinuose. Tegmina spatulate, long and slender, quite (♂) or nearly (♀) reaching the hind margin of the first abdominal segment. Hind femora comparatively robust, reaching the apex of the abdomen in the female, or surpassing it in the male by the length of the knees. Prosternal spine broad at base, the apex acuminate. Hind tibiæ 8-spined in outer row. Legs and apex of abdomen hirsute.

Head of male dirty white except a triangular patch on the occiput, sides of head back of eyes, a little patch below each antenna and the lower margin of cheeks and labrum which are deep brown or black. In the female the head is dark ferruginous varied with fuscous save on the cheeks below where it is much paler. Palpi white. Pronotum of the male deep chocolate brown except the pale dorsal stripe and lower edges, becoming black immediately where joining the pale portions; meso- and metathorax similarly colored as is also the first abdominal segment; segments 2-4 with broad lateral black patches. Sides of metathorax with a narrow oblique white line. Hind femora in male pale olive green, palest inside and below, the apical lunules alone black or piceous; in the female brownish testaceous with an oblique fuscous band on outer face of basal half and some dusky marks along the carinæ, inner face largely black as are also the apical lunules. Sides of abdominal segments 2 to 4 less broadly black than in the males.

Length of body, ♂, 15, ♀, 18; of pronotum, ♂, 3.3, ♀, 3.85; of tegmina, ♂, 2.85, ♀, 3; of hind femora, ♂, 9, ♀, 10.5 mm.

*Habitat.* — Island of Trinidad, a single pair in coitu, taken by G. E. Tryhane, of St. Anne's (Coll. L. Bruner).

67. *Schistocerca columbina* Thunberg.

*Gryllus columbinus* Thunb., Mem. Acad. St. Pétersb., IX, p. 399, 425 (1824).

*Acridium* (*Schistocerca*) *columbinum* Stal, Recens. Orthopt., I, p. 67 (1873).

*Schistocerca columbina* Brunn.-Redt., Proc. Zool. Soc. Lond., 1892, p. 210.

Although no specimens of this insect are at hand in the material before me it is known to occur on the Island of Trinidad, as well as on the mainland and most of the West Indian Islands. It is smaller than *S. simulatrix* Walker, to which it bears some resemblance.

68. *Schistocerca simulatrix* Walker.

*Cyrtacanthacris simulatrix* Walk., Cat. Derm. Salt. Brit. Mus., IV, p. 610 (1870).

*Schistocerca simulatrix* Scudder., Proc. Amer. Acad. Arts. Sciences, XXXIV, p. 454 (1899).

There are three specimens of what seems to be Walker's *simulatrix* at hand. They were collected by H. D. Chipman.

69. *Schistocerca pallens* Thunberg.

*Gryllus pallens* Thunb., Mem. Acad. St. Pétersb., V, p. 237 (1815).

*Acridium* (*Schistocerca*) *pallens* Brunn.-Redt., Proc. Zool. Soc. Lond., 1892, p. 210.

This last locust is widely distributed over tropical America, and while no specimens are contained in the collections at hand from Trinidad, it is known to occur on that island.

70. *Schistocerca americana* Drury.

There are two specimens, 1 ♂ and 1 ♀, at hand from Trinidad. They were received from W. E. Broadway.

The synonymy of this species can be ascertained by referring to Scudder's paper entitled "The Genus *Schistocerca*."

71. *Osmilia cœlestis* Burmeister.

*Acridium cœlestre* Burm., Handb. Ent., II, p. 634 (1838).

*Osmilia cœlestis* Brunn., Proc. Zool. Soc. Lond., 1893, p. 606.

This insect is represented by a rather large number of specimens of both sexes. They were taken by both H. D. Chipman and G. E. Tryhane. It also occurs on the Island of Grenada, as well as in British Guiana and other parts of tropical South America.

Just how it differs from *Gryllus violaceus* of Thunberg I cannot say, not having had the time to examine into the matter carefully.

Family LOCUSTIDÆ.

72. *Anaulacomera antillarum* Brunner.

*Anaulacomera antillarum* Brunn., Proc. Zool. Soc. Lond., 1897, p. 607.

A single ♀ of this species is before me from Trinidad. It was collected by H. D. Chipman.

73. *Anaulacomera furcata* Brunner.

*Anaulacomera furcata* Brunn., Monog. Phaneropt., p. 287 (1878).

One specimen, a female, was sent to me by Mr. Chipman, who collected it on the Island of Trinidad.

75. *Anaulacomera laticauda* Brunner?

*Anaulacomera laticauda* Brunn., Monog. Phaneropt., p. 292 (1878).

Still another species of the genus is represented by a single male and female. They seem to belong to *A. laticauda*, but do not quite agree with Brunner's description. As it is a more or less variable insect, I am inclined to place it here rather than with *lativertex*, from which it differs also. It was collected by H. D. Chipman.

76. *Ctenophlebia zetterstedti* Stål

*Phylloptera zetterstedti* Stål, Orthopt. Freg. Eugene, Resa, p. 322 (1860).

*Ctenophlebia zetterstedti*, Stål, Recens Orthopt., 2, p. 37.

Two males of this insect were received from Chipman, who collected them in the interior of the Island of Trinidad.

77. *Plagioptera bicordata* Serville.

*Locusta bicordata* Serv., Ency. Meth., X, p. 143 (1825).

*Pycnopalpa bicordata* Serv., Hist. Orthopt., p. 408 (1838).

*Plagioptera bicordata* Brunn., Monog. Phaneropt., p. 323, pl. VII, fig. 93 (1878).

Only a single female of this oddly marked katydid is at hand. It was captured and sent to me by Mr. H. D. Chipman. He took it in Trinidad.

78. *Microcentrum angustatum* Brunner?

*Microcentrum angustatum* Brunn., Monogr. Phaneropt., p. 335 (1878).

A single male is placed here. It was taken by Chipman on Trinidad Island.

**79. *Microcentrum lanceolatum* Burmeister.**

*Phylloptera lanceolata* Burm., Handb. Ent., II, p. 692 (1839).

*Microcentrum lanceolatum* Brunn., Monogr. Phaneropt., p. 335, pl. VII, fig. 97 (1878).

*Phylloptera laurifolia* de Haan, Bijdr., p. 197.

*Phylloptera salviaefolia* Sauss., Orthopt., Nov. Amer., p. 8.

Two females collected by Chipman are determined as belonging to this species.

**80. *Philophyllia guttulata* Stål.**

*Philophyllia guttulata* Stål., Ofv. Vet. Akad. Forhandb., 30, 4, p. 40 (1873); Brunn., Monogr. Phaneropt., p. 350, fig. 102 (1878).

*Locusta laurifolia* Thunb., Mem. Acad. St. Pétersb., V, p. 281 (1815).

The collections contain a male from Chipman and a female from W. E. Broadway.

**81. *Philophyllia latior* Brunner.**

*Philophyllia latior* Brunn., Monogr. Phaneropt., p. 551 (1878).

A single female of this second species of the genus is at hand, H. D. Chipman, collector.

**82. *Stilpnochlora marginella* Serville.**

*Phylloptera marginella* Serv., Hist. Ins. Orthopt., p. 405 (1839).

*Stilpnochlora marginella* Stål, Recens Orthopt., 2, p. 44.

*Phylloptera thoracica* Burm., Handb. Ent. II, p. 693 (1838).

*Microcentrum thoracicum* Scudd., Bost. Journ. Nat. Hist., VIII, p. 447.

*Phylloptera coulouiana* Sauss., Rev. et Mag. Zool. (?), XIII, p. 128 (♀) (1861).

A male specimen of this common large katydid was sent to me by W. E. Broadway who collected it on the Island of Trinidad.

**83. *Peucestes coronatus* Stål.**

*Peucestes coronatus* Stål, Recens Orthopt., 2, p. 45; Brunner, Monogr. Phaneropt. p. 366 (1878); Sauss. et Pict. Biol. Cent. Amer., I, p. 307, pl. XVIII, fig. 1, ♀ (1898).

Two beautiful specimens, both males, were taken by H. D. Chipman.

### Subfamily PSEUDOPHYLLINÆ.

**84. *Brisilis chipmani*, new species.**

General color griseous varied with fuscous. About the size of *B. tenebrosa*, but differing from that species in color and by having the hind wings tessellate instead of unicolorous.

Front piceous bordered with black. Inner basal half of mandibles also black. Sides and disk of pronotum more or less varied with fuscous, the hind lobe unitubercu-



late on each side of disk in front. Tegmina having a sort of maculate appearance due to the fuscous background and the pale testaceous veins, nervures and veinlets, the latter of which are drawn together in clusters leaving darker spots without them. Spines of legs compressed or flattened, hairy and more or less curved apically; 3-5 minute ones on the inner side of anterior, 4 larger on outer side of intermediate, and 9 on outer carina of posterior femora; those on hind tibiae above strong, inside 12 and longer, outside 10 and weaker. Hind femora with a dash of black internally near the base. Ovipositor serrato-crenulate on upper edge, near the apex with three transverse rugæ and the same number of round tubercles. Subgenital plate triangular with the apex rather acutely and deeply emarginate. Pro-, meso-, and metasternum together with inner side of middle and hind femora, and the middle tibiae shining black. Ovipositor piceous, inclining to black apically. Antennæ broadly annulate with pale and dusky.

Length of body, ♂, 35, ♀, 40-42; of pronotum, ♂, 8.25, ♀, 10.15; of tegmina, ♂, 4.5, ♀, 53-57; of anterior femora, ♂, 13, ♀, 15; of hind femora, ♂, 26, ♀, 31-34; of ovipositor, 27-29 mm.

*Habitat.* — Island of Trinidad, H. D. Chipman, collector, 2 ♂, 1 ♀, W. E. Broadway.

**85. *Platyphyllum* (?) *modestum*, new species.**

Rather below the medium in size, testaceous varied with small fuscous streaks along the veins of tegmina.

Front strongly oblique, testaceous. Pronotum rugose, the transverse sulci deep. Tegmina rough, testaceous varied with a few dark streaks along the veins. Meso- and metasternum unicolorous, dark testaceous. Wings a little infuscated, not tessellate. Legs shortly pilose. Anterior femora a little compressed and arcuate at base, above carinate on apical third, 5-spined below on anterior margin; middle pair 4-spined; anterior and middle tibiae without spines above; hind femora 7- or 8-spined. Subgenital plate triangular, not notched. Ovipositor of moderate size, nearly straight, the disk towards the apex provided with two or three transverse rugæ, pale at base, piceous at apex.

Length of body, ♀, 29, of pronotum, 6.75, of tegmina, 28, width of tegmina, 7, length of anterior femora, 9, of hind femora, 17, of ovipositor, 14 mm.

*Habitat.* — Island of Trinidad, H. D. Chipman, collector. A single female specimen.

This insect does not agree very well with the diagnosis of the genus *Platyphyllum*, but insisted on running there when going over the synoptic table of genera in Brunner's Monograph of the Pseudophyllidæ.

**86. *Meroncidius atrispinosus*, new species.**

A little above the medium in size, anterior and middle femora provided with four black spines; hind femora 8-spined, these likewise black.

Testaceous. Antennæ unicolorous, testaceous. Pronotum unicolorous, rather

coarsely granulose, very faintly tuberculate in front, the transverse sulci rather profound, especially the posterior one; lateral lobes with the lower edge very strongly bordered. Tegmina surpassing the tips of hind femora and nearly reaching the apex of the ovipositor, their posterior edge faintly brownish piceous, otherwise testaceous. Wings ample, infumate, the cross-veins fuscous. Ovipositor not unusually heavy or long, its apical third tapering, the apex slender and gently upcurved, black, the basal part testaceous. Last ventral segment or subgenital plate broadly bilobed, the middle deeply emarginate, the apex of the lobes truncate. Disk of ovipositor without any distinct rugae.

Length of body, ♀, 42, of pronotum, 9, of tegmina, 48, width of tegmina, 11, length of anterior femora, 14, of hind femora, 30 mm.

*Habitat*. — Island of Trinidad, 1 ♂, W. E. Broadway, collector.

There is before me a second ♀ specimen taken by the same person, which lacks the spines on the anterior femora as well as all traces of the auditory apparatus. Otherwise, the two are the same in every respect. It is possible that this second insect met with an accident very early in its life which resulted in the removal of auditory apparatus and spines. Not only the spines on the legs but a space about their base is likewise black.

#### 87. *Bliastes insularis*, new species.

Size medium or small. General color pale testaceous. Occiput provided with a large triangular black patch, the apex of which is directed anteriorly; the fastigium and down middle of face to ocellus shiny black; base of the clypeus and lower face, together with the labrum, black. Antennae pale testaceous throughout. Pronotum granulose, the posterior lobe shortest and having the lateral angles and hind margin blackish; last transverse sulcus back of the middle, quite profound. Tegmina rather narrow, their apex rounded, all the veins and veinlets pale testaceous, near the base with a faint greenish tinge, the background pale brown giving these members a slightly speckled appearance where the veinlets are missing or further apart than usual. Wings likewise pale, a very little infuscated apically. Anterior femora 4-spined; intermediate 3-spined; hind pair with 5-7 pale-colored ones that are black-tipped. Genicular lobes of hind femora both internally and externally rounded. Anterior and middle tibiae above without spines, the former somewhat fuscous on upper side save at auditory apparatus which is testaceous, giving to it a banded appearance. Ovipositor gently curved, dark piceous, the base and a longitudinal median line testaceous.

Length of body, ♀, 34; of pronotum, 6; of tegmina, 36; of hind femora, 18 mm.

*Habitat*. — Island of Trinidad, West Indies, January, two females, H. D. Chipman, collector.

#### 88. *Diophanes perspicillatus* Stoll.

*Perspicillata* Stoll, Rept. Spect., etc., pl. VIII, a, figs. 23, 24 (1787).

*Diophanes perspicillatus* Brunn., Monog. Pseudophyll., p. 242, fig. 109 (1895).

*Locusta salicifolium* Licht., Trans. Linn. Soc. Lond., IV, p. 51.

*Platyphyllum salicifolium* Brulle, Hist. Nat. Ins., X, p. 139.

*Diophanes rosaceus* Stål, Obs. Orthopt., I, p. 39 (1875).

W. E. Broadway sent me a single female of this beautiful insect with the statement that it was captured on the Island of Trinidad.

#### Subfamily CONOCEPHALINÆ.

##### 89. *Exocephala viridis* Redtenbacher.

*Exocephala viridis* Redt., Monog. Conocephalidæ, p. 347, 33 (1891).

A single female specimen of this species was collected on Trinidad Island and sent to the writer by H. D. Chipman.

##### 90. *Conocephalus guttatus* Serville.

*Conocephalus guttatus* Serv., Hist. Ins. Orthopt., p. 518 (1839).

*Conocephalus guttatus* Redt., Monog. Conocephal., p. 78, 392, fig. 33 (1891).

? *Gryllus obtusus* Stoll., Spectres, etc., pl. XVIII, b, fig. 64 (1815).

This species is represented by three females (H. D. Chipman, collector).

##### 91. *Conocephalus pichinchæ* Bolivar.

*Conocephalus pichinchæ* Bol., Artropods Viaje al Pacif., p. 100 (1884); Redt., Monog. Conocephal., p. 78, 392, 1891.

One male (H. D. Chipman).

##### 92. *Conocephalus maxillosus* Fabricius.

*Locusta maxillosa* Fabr., Ent. Syst., II, p. 37 (1794).

*Conocephalus maxillosus* Serv., Hist. Ins. Orthopt., p. 520 (1839).

There are two specimens of this species before me. One, a male, was collected by H. D. Chipman, and the other, a female, was received from W. E. Broadway.

##### 93. *Conocephalus frater* Redtenbacher.

*Conocephalus frater* Redt., Monog. Conocephal., p. 85, 399, 1891.

Only a single male of this species is at hand. It comes from Mr. Chipman, who took it on Trinidad Island.

##### 94. *Conocephalus nigrolimbatus* Redtenbacher.

*Conocephalus nigrolimbatus* Redt., Monog. Conocephal., p. 87, 401, 1891.

This is the fifth *Conocephalus* at hand from Trinidad. It is a male specimen from Mr. Chipman.

##### 95. *Xipidium propinquum* Redtenbacher.

*Xipidium propinquum* Redt., Monog. Conocephal., p. 208, 522 (1891).

There are two females of a species of *Xiphidium* at hand which are determined as above. They were received from Mr. G. E. Tryhane, of St. Anne's, Trinidad.

96. ***Thysdrus virens* Thunberg.**

*Thysdrus virens* Thunb., Mem. Acad. St. Pétersb., V, p. 274 (1815); Redt., Monog. Conocephal., p. 224, 538 (1891).

*Phlugis chrysopa* Bol., Orthopt. Cuba, p. 37 (1888).

Four female specimens from H. D. Chipman and one from Mr. Tryhane represent this widely distributed species.

97. ***Thysdrus mantispa* Bolivar.**

*Phlugis mantispa* Bol., Orthopt. Cuba, p. 39 (1888).

Only a single specimen of this insect is at hand. It comes from H. D. Chipman who took it on the Island of Trinidad.

Family GRYLLIDÆ.

Subfamily GRYLLOTALPINÆ.

98. ***Gryllotalpa hexadactyla* Perty.**

*Gryllotalpa hexadactyla* Perty, Del. Anim. Artic. Brasil, p. 119, pl. 23, fig. 9 (1830).

This widely distributed mole cricket of the tropics was taken by Chipman. One specimen is before me.

99. ***Scapteriscus didactylus* Latreille**

*Gryllotalpa didactyla* Latr., Hist. Nat. Crust. et Ins., XII, p. 122 (1802).

*Scapteriscus didactylus* Scudd., Mem. Peabody Acad. Sci., I, p. 10, pl. 1, figs. 1, 14 (1869).

This second mole cricket was collected by both Broadway and Chipman. A number of specimens are in the collections which form the bases for this report. This insect is a plague in some of the sugar cane fields of tropical America.

Subfamily TRIDACTYLINÆ.

100. ***Tridactylus (Heteropus) histrio* Saussure.**

*Tridactylus (Heteropus) histrio* Sauss., Biol. Cent. Amer. Orthopt., I, p. 207 (1896).

There are several specimens of this little cricket before me. They were collected by H. D. Chipman on the Island of Trinidad.

101. ***Rhipipteryx rivularia* Saussure.**

*Rhipipteryx rivularia* Sauss., Biol. Cent. Amer. Orthopt., I, p. 212, pl. XI, fig. 20 (1896).

Seventeen individuals represent this really pretty little insect. They come from Chipman and Tryhane. No doubt several other representatives of the subfamily are to be found on the island.

Subfamily GRYLLINEÆ.

102. *Nemobius trinitatis* Scudder.

*Nemobius trinitatis* Scudd., Journ. N. Y. Ent. Soc., IV, p. 104 (1896).

Mr. Chipman also sent a single female of this species. It agrees with Scudder's description in every respect.

103. *Anurogryllus muticus* DeGeer.

*Gryllus muticus* DeG., Mem. Ins., III, p. 520, pl. 43, fig. 2 (♀).

*Gryllodes muticus* Sauss., Miss. Scient. Mex., Orthopt., p. 411, 1 (♂, ♀), pl. 7, fig. 9 (♂).

I find a male specimen among a small collection of pinned insects which was recently received from W. E. Broadway. He collected it on the Island of Trinidad.

104. *Gryllus assimilis* Fabricius.

*Gryllus assimilis* Fabr., Syst. Ent., p. 280 (1775).

*Gryllus assimilis* Sauss., Miss. Mex., Orthopt., p. 396, pl. 8, figs. 27-29 (1870).

*Gryllus verticalis* Serv., Hist. Orthop., p. 343 (♀) (1839).

*Gryllus aztecus* Sauss., Rev. et Mag. Zool., XI, p. 316 (1859).

*Gryllus cubensis* Sauss., Rev. et Mag. Zool., XI, p. 316 (1859).

These names, together with a number of others used by Walker and some of the different writers on Orthoptera, constitute the synonymy of the present species.

Only a single female specimen collected by Mr. Chipman is at hand, from the Island of Trinidad.

105. *Miogryllus pusillus* Burmeister.

*Gryllus pusillus* Burm., Handb. Ent., II, p. 733 (1838); Sauss., Mel. Orthopt., 5e Fasc., p. 362, pl. XI, fig. 7.

*Gryllodes pusillus* Sauss., Miss. Scient. Mex., Orthopt., p. 416, pl. 7, fig. 6 (♀).

*Miogryllus pusillus* Sauss., Biol. Cent. Amer. Orthopt., I, p. 227.

This is still another South American cricket that has found its way to the Island of Trinidad. It is represented by a single male that was obtained by Mr. Chipman who sent me about all of the good things.

Subfamily MYRMECOPHYLINÆ.

106. *Ectatoderus insularis*, new species.

The present species is most nearly related to *E. alatus* Sauss., a Brazilian insect, from which it differs in being considerably larger, in lacking the pale border to the

posterior edges of the pronotum and abdominal segments and in having the disk of the pronotum ferruginous instead of brownish testaceous. The pronotum is broadly rounded behind and projects beyond the pronotum about one half as far as their extreme width; the tegmina are testaceous, and have their sides and apex broadly bordered with fuscous; the speculum is triangular.

General color of head, legs and wings testaceous, more or less varied with pale brown; pronotum ferruginous, abdomen fuscous inclining to black apically. The entire insect is sparsely squamulose and hirsute, the legs especially are provided with a number of long bristle-like hairs.

Length of body, ♂, 10.5; of pronotum, 3.8; of tegmina beyond the pronotum, 2; of hind femora, 6.25 mm.

*Habitat*. — A single male collected on the Island of Trinidad by H. D. Chipman. (Coll. L. Bruner.)

This specimen is more or less mutilated, being much rubbed and minus the cerci. In some respects it seems to agree more closely to the genus *Liphoplus* but in its facial and hind tarsal characters agrees more closely with *Ectatoderus*.

#### Subfamily TRIGONIDINÆ.

##### 107. *Cyrtoxiphus gundlachi* Saussure.

*Cyrtoxiphus gundlachi* Sauss., Miss. Scient. Mex., Orthopt., p. 373 (1870).

A single male specimen received from H. D. Chipman is referred here.

##### 108. *Cyrtoxiphus vittatus* Bolivar?

*Cyrtoxiphus vittatus* Bol., Mem. Soc. Zool. France., I, p. 159 (1888).

A pair of little crickets belonging to a second species of this genus from Trinidad are referred doubtfully to *vittatus* since this species seems to be quite generally distributed throughout the West Indies. Mr. Chipman was the collector.

#### Subfamily ECANTHINÆ.

##### 109. *Ectecous cantans* Saussure.

*Ectecous cantans* Sauss., Biol. Cent. Amer. Orthopt., I, p. 244, pl. XII, figs. 8, 9, 10 (1899).

I have a single male specimen which has been determined as this species. It was collected by Chipman.

##### 110. *Ecanthus immaculatus*, new species.

A long, slender-bodied, pale, greenish-white species without any trace of black dots or other markings on face or basal antennal joints. Tegmina reaching tip of hind femora, the wings caudate, fully 4 mm. longer than the elytra. Hind



tibiae provided with three rather conspicuous spines on inner side of apical third, and two less conspicuous ones on outer side. Pronotum about twice as long as broad, the greatest width immediately above the base of anterior legs. Ovipositor rather heavy and with the apical portion gently upturned; anal stylets longer than ovipositor, quite slender, and roundly bent downwards on outer third.

Length of body, 13.5 mm.; of pronotum, 2.9 mm.; of tegmina, 12 mm.; of wings, 16 mm.; of hind femora, 10 mm.

*Habitat.* — ♀ 1, Island of Trinidad, West Indies, H. B. Chipman collector. (Coll. L. Bruner.)

#### Subfamily ENEOPTERINÆ.

##### 111. *Apithes annulicornis* Saussure.

*Apithes annulicornis* Sauss., Miss. Scient. Mex., Orthopt., p. 491 (1870).

A single female specimen collected by Chipman on the Island of Trinidad.

##### 112. *Aphonus silens* Saussure?

*Aphonus silens* Sauss., Melang. Orthopt. Gryll., p. 805 (1878).

I find a single rather large gryllid among the collections obtained by Chipman on the Island of Trinidad which is referred here with some doubt.

In addition to the insects listed and described on the preceding pages there are at least four or five additional forms which I have not yet determined. Two or three belong to the Tettiginæ as referred to on a previous page, another to the Phaneropterinæ and the last to the Gryllidæ. These will be reported upon later in a separate paper.

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EDITORIAL.

The April issue of our interesting contemporary, *Entomological News*, contains much matter devoted to our criticism of the work of its editor. We feel a sense of amusement at the editor's efforts to "save his face." We would repeat that until Dr. Skinner produces a better classification of the Hesperiidæ, he must accept the one advanced by us, or abandon all generic names and simply list the species of Skippers in any order that pleases him. The generic names he uses cannot be defended. We notice he has not attempted it. Dr. Skinner persists in crediting the new classification to us. It is original with Scudder and Watson. It was Mabilles's imperfect presentation of it, as applied to the American forms, that induced us to attempt the subject. Dr. Skinner makes certain criticisms of the characters used, with which, in part, we agree. It is probable that we are aware of more imperfections in the system than Dr. Skinner is, owing to his lack of critical study of genera. His dogmatic utterances that this species is more nearly related to that, etc., although placed by us in different genera, are not due to actual knowledge. Dr. Skinner knows nothing of the early stages and belittles structure: his assertions are founded solely on his ideas of superficial resemblance. His criticism of the use of secondary sexual characters in generic definition is, perhaps, well made; but everybody uses these convenient characters, except Sir George F. Hampson, and even he uses them for subgenera.

Their use in this case is perfectly sanctioned by custom and the authority of many of the best systematists. It is true that exactly what characters shall be used in generic definition can never be arbitrarily asserted nor established by rule; that will depend upon individual ability and tact. If Dr. Skinner does not like the Scudderian system, let him produce another for comparison with it. No positive advance can be made through wholesale criticism without constructive work.

#### BOOK NOTICES.

*Les Moustiques*, Histoire Naturelle et Médicale, Par RAPHAËL BLANCHARD, Professeur à la Faculté de Médecine de Paris, Membre de l'Académie de Médecine. Paris: F. R. de Rudeval, 1905.

The book contains 673 pages in seven chapters and an appendix, including introductory definitions, systematic account of the species, their pathological properties, prophylaxis, methods of collecting and breeding and a list of recently described species (appendix). The general account refers at some length to allied forms, *Simulium*, *Tipula*, *Dixa*, *Chironomus*, etc., with text figures. The Corethridæ are not included as mosquitoes. Theobald's classification is adopted, based as it is largely on unimportant scale characters, although somewhat modified by the introduction in the text of the subfamilies Sabethinæ and Joblotinæ to replace Theobald's nameless sections B and C. This is really a distinct improvement and approximates the classification to that of Lutz, epitomized on page 619. Figures of adults and larvæ are copied from various authors and inserted as text figures. This has resulted in some errors. On page 297 a figure of a larva is given as *confinis* Arrib.; it should be transferred to *jamaicensis* Theob., page 279. Page 403, *Aedes smithii* should be transferred to *Wyeomyia* in the Sabethinæ. Errors of this nature are liable to occur in a compilation, such as Professor Blanchard's work essentially is, and are due to incomplete following up of the subsequent literature. Professor Blanchard is an enthusiastic follower of Theobald, and he has taken advantage of that author's remarkable ability in the creation of homonyms to propose a number of new and beautifully formed generic terms. He has also changed Theobald's badly made names into the proper grammatical forms, which we think he has no right to do. These names will have to stand as first proposed, bad as they are. Fortunately most of them will fall into the synonymy when the scale

characters on which they are founded are relegated to their proper place of subordination. Professor Blanchard's book is really a mine of information about mosquitoes. We only regret that he did not print his own synoptic tables and classification, which were prepared at much pains as he tells us, but thrown in the waste basket on seeing Theobald's book, in an access of enthusiasm, scarcely deserved, we fear. "Les Moustiques" should be in the hands of every student of mosquitoes.

*A Monograph of the Anopheles Mosquitoes of India.* By S. P. JAMES, M.B., I.M.S., and W. GLEN LISTON, M.D., I.M.S. Calcutta, 1904.

The authors find twenty-four species of *Anopheles* in India, of which they know the larvæ of eighteen. The adults are figured on a green background, which relieves the white scales beautifully and gives a very fine effect. The species should be easily recognized. Ten of the larvæ are figured. The larvæ all differ from the American species in the greater development of the fan-shaped dorsal tufts, which are present on the second abdominal segment in all cases and in many also on the first abdominal and on the metathorax. The larvæ must therefore have even a closer connection with the surface film of the water than is the case with our species. Most of the species have the front of the head triangularly produced and the antennæ much thickened, though some are more rounded like our species. *A. barbirostris* Van der Wulp is nearest in aspect to ours. The species are divided into two groups: first, with the antennal tuft branched (as in our species), containing three species; second, antennæ without branched hair, containing fifteen species. The first group is subdivided by the frontal hairs being simple or branched; the second by the presence or absence of the fan-shaped tuft on the thorax. The details of the frontal hairs and the fan-shaped tufts are used to separate the species. Six types of *Anopheles* eggs are shown (p. 39), which differ remarkably in the development and position of the "floats." This structure is present in all, though in *A. turkhudi* Liston it is reduced to a little dorsal ellipse near one pole of the egg. The authors reject Theobald's genera of the Anophelinæ founded on scale characters (with their reasons for rejection given in detail) and place all the species in *Anopheles*. They nevertheless divide them into ten groups on general affinity, but without any very sharp diagnostic characters.

THE  
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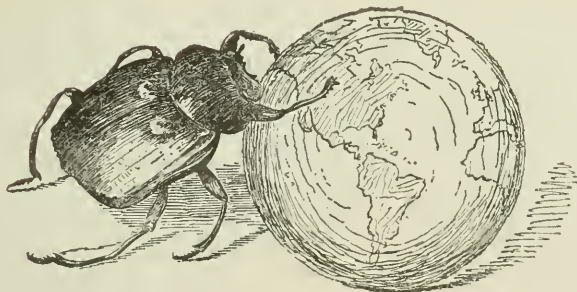


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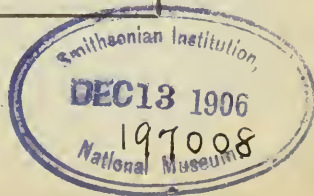
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## JOURNAL

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Class I, HEXAPODA.

Order IV, DIPTERA.

THE LARVÆ OF CULICIDÆ CLASSIFIED AS  
INDEPENDENT ORGANISMS.

BY HARRISON G. DYAR AND FREDERICK KNAB.

WASHINGTON, D. C.

(Plates IV-XVI.)

"Wer A sagt muss auch B sagen."—*German proverb.*

We are compelled to the conclusion that specific limits are more sharply defined or at least more readily appreciable, in the larvæ of the Culicidæ, than in the adults, although generic limitations are less closely drawn. In the larvæ we observe many marked modifications in shape and details of the chitinized parts which appear constant for the species and lend themselves readily to definition, while, in the adults, the specific characters, in the females at least, seem largely dependent upon comparatively undefined differences in coloration, which are easily lost or obscured if the specimen is at all injured in emergence or worn by flight. We are further impelled to present the results of our study of the larval forms separately for the following considerations. Dr. L. O. Howard has placed in the hands of the senior author all the larval material collected with the aid of grants from the Carnegie Institution of Washington for a monograph of the

Culicidæ of North and Central America, for classification and description, with the very kind permission to publish descriptions of the new larvæ in advance of the monograph. The adults have been given into other custody, and the determinations that have been transmitted to us are, in many cases, at variance with larval characters. We have been unable to personally examine into the discrepancies without exceeding the field which has been assigned to us. Therefore it seemed advantageous to treat the larvæ as independent organisms and classify them separately, especially as an independent classification, consistently worked out, when compared with the one based on adult characters, should throw light on the phylogeny of the group and indicate the more reliable distinctions. If any apology is due for proposing new names for larval forms, we hereby make the apology. To us, it seems justified in this case, especially as, in nearly all cases, bred adults are in the hands of our co-workers. We find, moreover, that a synonym is easily dealt with, whereas a misidentification or confusion of two species under one name is really more troublesome. Therefore, if it shall prove that we have named the larvæ of previously described species, we believe that less difficulty will be experienced than if we had left them nameless, or doubtfully referred them to known species.

The junior author has made a trip to the West coast of Central America after mosquito larvæ and has been closely associated with the work subsequently as artist for the early stages. We are indebted to Dr. Howard for the opportunity to study the material, as well as the drawings of the mouth parts made by Miss Evelyn G. Mitchell and Miss Mary Carmody for the monograph. We also feel grateful to Dr. Howard's numerous assistants and correspondents, who have helped to collect the material and, especially, to Mr. August Busck and Mr. F. W. Urich, who have obtained so many of the West Indian species.

The identifications of adults here used have been made by Mr. D. W. Coquillett of the Bureau of Entomology, U. S. Department of Agriculture, custodian of Diptera in the U. S. National Museum. We have accepted these determinations wherever there existed no apparent reason to discredit them. We have not personally verified them in any case, as the specimens are not before us.

## Family CULICIDÆ.

*Definition.*

The larvæ of the Culicidæ are characterized by a well-formed head, enclosed in a chitinous covering, with compound eyes, single-jointed antennæ, a vibratile or prehensile group of hairs before the oral orifice, well-developed toothed mandibles with a row of cilia, quadrate or conical hirsute maxillæ and a short single-jointed palpus. The thoracic segments are consolidated into a transversely elliptical flattened mass; the abdomen consists of nine segments slender and submoniliform, the eighth with a dorsal respiratory opening, often prolonged into a chitinous tube, connecting with two tracheæ running the length of the body. The last segment is smaller, is furnished with a chitinous plate and usually with four delicate anal appendages. The body is supplied with setæ in tufts or singly, usually more or less conspicuously feathered. There are generally present certain scales on the sides of the eighth segment and in two rows on the posterior aspect of the air tube.

From the other aquatic Nematoceros Diptera, the Culicidæ are separable by the presence of the mouth brush, the shape of the anal segment and the absence of abdominal feet. The Corethridæ and Dixidæ run very close to the Culicidæ, and seem, indeed, inseparable therefrom on any one character, although different enough in the general complex of characters.

*Classification.*

Until their very recent sudden rise into economic importance, the Culicidæ have been a much neglected family. Very lately there has arisen great activity in the collection and study of these insects, which has resulted in an extensive work by Mr. F. V. Theobald of Wye, England, based on the large material which has been accumulated at the British Museum. The results have been remodelled by Prof. R. Blanchard of Paris, France, and certain crudities eliminated, the whole now presented to the public in excellent form. The system seems to us unsound from top to bottom. We cannot restrain a feeling of surprise that eminent authors should adopt such weak characters for the separation of subfamilies and genera. Much weight is given to the length of the palpi in the male or female, to which we find two fundamental objections. The length of palpi



is, in our experience, never an important character, in any insects, being adaptive and not of more, often of less than generic value. When a character exists in one sex only, it is of far less importance, belonging to the class of secondary sexual characters, which by some systematists of standing are uniformly denied to be of even generic value. In this case, both these objections, applying together, have added force and appear to us to utterly discredit any system founded on them.

In the definition of genera, much importance is attached to the shape and arrangement of the scales. To any one conversant with the value of different characters in insects, this appears, a priori, an unfortunate selection. How it works cannot be better shown than by a quotation from James and Liston\*, whose common sense remarks deserve the greatest publicity:

"In the classification of mosquitoes Mr. Theobald relies almost entirely upon scale structure for the distinctions between different genera, and in one case he has used this character alone for the formation of a subfamily.

"The classification is based in great part on the shape, and not upon the presence or absence of scales, and it is a matter of great difficulty to decide in some cases what form of scale predominates; nor does Mr. Theobald give any indication of what portion of a wing, for example, should be examined to decide this point.

"The terms 'lanceolate', 'long and narrow', 'true scales', etc. are not sufficiently definite to permit of such scales being easily distinguished from one another, except perhaps by Mr. Theobald himself. It is obvious that the distinction between 'hair-like curved scales' and 'narrow curved scales' is not great, and also that it would be difficult to decide whether the abdomen is 'hairy' or whether it is covered with 'hair-like scales' which apparently resemble hairs so closely that they cannot be termed 'true scales.' As regards the wing again it would be certainly difficult to decide whether most of the scales were 'lanceolate' or whether they were 'mostly long and narrow' especially as the part of the wing to be examined is not stated, but on this decision alone depends the distinction between the genera *Anopheles* and *Myzomyia*.

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\*A monograph of the *Anopheles* mosquitoes of India, Calcutta, 1904; pp. 16 and 64.



"One of the objects of classification is to simplify the identification of species, but the new classification does not aid this in any way. In practice, it will be found much easier to determine the specific name of any specimen than its generic name according to the new system.

"Species which differ widely in their habits and pathological significance are placed in the same genus, while those which are similar in these important respects are placed in different genera.

"Species of which the eggs and larvæ, the characters of which are at least as important as the shape of the wing scales in the adult insect, are essentially different are placed in the same genus, while those with eggs and larvæ of the same type are placed in different genera.

"The distinctions between the different genera are not of equal value, for whereas certain species are placed in different genera because in the one case the wing scales are 'lanceolate' while in the other they are 'mostly long and narrow'; the fact that the abdomen of one is densely covered with scales while that of the other is, practically speaking, entirely free from them, is not considered sufficient to warrant these two species being placed in different genera.

"Abnormal forms or monstrosities have been made the basis of new genera and species. During the examination of the types of *Anopheles rossi* deposited in the British Museum, Mr. Theobald encountered a specimen the abdomen of which was covered with scales arranged as in mosquitoes of the genus *Culex*. To us it appears very probable that this is an instance of a monstrosity. Mr. Theobald, however, classifies the insect without question as the type of a new genus (*Aldrichia*). Another instance is the specimen on which Mr. Theobald has founded a new subfamily (*Heptaphlebomyina*); the single insect was provided with seven longitudinal veins on its wings instead of only six."

The final test of any system of classification is the degree of its agreement with the phylogeny of the group. The past history is indicated by all the stages, often more clearly in the larvæ than in the adults. We present the following study of the Culicid larvæ in the hope that it may elucidate the subject. The senior author has shown\* that adult characters, rightly understood, harmonize beautifully with those of the larvæ in the case of subfamilies. We be-

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\*Science, n. s., xxiii, 233, 1906. The classification of Dr. Lutz, in C. Bourroul, Mosquitoes do Brasil, Bahia, 1904, approaches this.

lieve that the same relation can be traced to genera and, indeed, have in mind certain adult characters which we think would work out excellently. At present, however, we are restrained by the limitations of our field from applying these ideas.

After writing the above we have seen a recent classification by Mr. Coquillett (Science, n. s., xxiii, 312, 1906) in which one of our characters, the tarsal claws of the female, is used to good effect. Otherwise the arrangement is based too largely on larval characters\* to be of value in the present connection. We wish to compare our arrangement, based solely on larval characters with one based solely on adult characters. The only one so available is that of Mr. Theobald, which does not stand the test of that comparison, for the reasons we have discussed.

*Table of subfamilies.*

Air tube short and sessile; a series of subdorsal palmate hair tufts on the abdomen.....	ANOPHELINÆ
Air tube elongate, at least longer than wide; no dorsal palmate hairs.	
Anal segment with an unpaired ventral brush or rudder of dense hair tufts.....	CULICINÆ
Anal segment without unpaired median ventral brush.....	SABETHINÆ

Subfamily ANOPHELINÆ

*Table of genera.*

Abdomen with plumose lateral hairs only on the first three segments; head with plumose hairs.....	<i>Anopheles</i>
Abdomen with plumose lateral hairs to the sixth segment; head with small simple hairs only.....	<i>Coclodiazesis</i>

Genus ANOPHELES Meigen.

- Anopheles* Meigen, Syst. Besch. bek. eur. zweifl., Inst., i, 10, 1818.  
*Cyclocephtron* Theobald, Jn. trop. med., iv 234, 1901.  
*Cyclocephidopteron* Blanchard, Cont. rend. heb. soc. biol., liii, 1045, 1905.  
*Grassia* Theobald (not Fisch), Jn. trop. med., v, 181, 1902.  
*Myzomyia* Blanchard, Cont. rend. heb. soc. biol., liv, 795, 1902.  
*Stethomyia* Theobald, Jn. trop. med., v, 181, 1902.  
*Howardia* Theobald (not Dalla Torre), Jn. trop. med., v, 181, 1902.  
*Pyretophorus* Blanchard, Cont. rend. heb. soc. biol., liv, 795, 1902.

\*Miss Mitchell's generalization, adopted by Mr. Coquillett, about the egg-laying habits is fallacious, and will not hold. This might have been anticipated as it is clearly an adaptive character.

- Rossia* Theobald (not Bonaparte, not Owen), Jn. trop. med., v, 181, 1902.  
*Myzorhynchus* Blanchard, Cont. rend. heb. soc. biol., liv, 795, 1902.  
*Laverania* Theobald (not Grassi and Feletti), Jn. trop. med., v, 181, 1902.  
*Nyssorhynchus* Blanchard, Cont. rend. heb. soc. biol., liv, 795, 1902.  
*Cellia* Theobald, Mon. Culic., iii, 107, 1903.  
*Arribalzagia* Theobald, Mon. Culic., iii, 81, 1903.  
*Aldrichia* Theobald, Mon. Culic., iii, 353, 1903.  
*Christya* Theobald in Giles, Rev. Anoph., suppl. i, Handb., Gn. or Mosq., 2 ed. 40, 1904.  
*Lophomyia* Theobald in Giles, Rev. Anoph., suppl. i, Handb. Gnats or Mosq., 2 ed., 366, 1904.

*Table of species.*

1. A pair of palmate hairs on the second abdominal segment (2d to 7th)... 2  
     No palmate hairs on the second abdominal (3d to 7th)..... 4
2. Comb of the eighth segment with the teeth coarsely serrate below. *albipes*  
     Comb teeth finely and inconspicuously serrate..... 3
3. Comb with the two upper long teeth with a short tooth between; three  
     lower teeth with five between..... *argyrotarsis*  
     Comb with the two upper teeth with none between; three lower with four  
     between..... *albirana*
4. Comb with seven long teeth regularly alternating with six short ones  
     ..... *mediopunctatus*  
     Comb with short teeth irregularly alternating..... 5
5. Comb with the four upper teeth short..... *maculipes*  
     Comb with some of the upper teeth long, at least the first or third..... 6
6. One long lower tooth, followed by four little ones..... *franciscanus*  
     One long lower tooth, followed by three little ones..... *punctipennis*  
     Lower long tooth followed by another as long or nearly so..... 7
7. Upper tooth short..... 8  
     Upper tooth long..... 9
8. Two long lower teeth followed by *two* short, one long, *three* short ones  
     ..... *grabhamii*  
     Two long lower teeth followed by *three* short, one long, *four* short ones  
     ..... *maculipennis*
9. The three upper teeth long..... *ciseni*  
     The second upper tooth short..... 10
10. One short tooth between the two upper long ones..... *cruciaus*  
     Three short teeth between the two upper long ones... *pseudopunctipennis*

*Anopheles albipes* Theobald.

- Anopheles argyrotarsis albipes* Theobald, Mon. Culic., i, 125, 1901.  
*Nyssorhynchus cubensis* Blanchard, Les Moustiques, 204, 1905. †

Recorded from South America and the West Indies. Our specimens are from Port Limon, Costa Rica.

**Anopheles argyrotarsis Desvoidy.**

*Anopheles argyrotarsis* Desvoidy, Mem. soc. d'hist. nat. Paris, iii, 411, 1827.  
*Nyssorhynchus albimanus* Blanchard (in part), Les Moustiques, 202, 1905.

Blanchard makes this a synonym of *albimanus*. The names have been given us separately and the larvæ differ. Our specimens are from Rincon Antonio, Oaxaca, Mexico.

**Anopheles albimanus Wiedemann.**

*Anopheles albimanus* Wiedemann Dipt. exot., 10, 1821.  
*Nyssorhynchus albimanus* Blanchard, Les Moustiques, 202, 1905.

Recorded from South America and the West Indies. We have it from Trinidad, Martinique and St. Domingo (Busck).

**Anopheles mediopunctatus Theobald.**

*Cyclopepteron mediopunctatus* Theobald, Mon. Culic., iii, 60, 1903.

Described from Brazil. The junior author obtained a specimen in Cordoba, Mexico, which has been so named.

**Anopheles maculipes Theobald.**

*Arribalzagia maculipes* Theobald, Mon. Culic., iii, 81, 1903.

Described from Brazil and Trinidad. Our specimens are from Trinidad (Urich), one of the type localities.

**Anopheles franciscanus MacCracken.**

*Anopheles franciscanus* MacCracken, Ent. news, xv, 12, 1904.

Described from California. We have specimens from Salina Cruz and Cordoba, Mexico, as well as Miss MacCracken's material.

**Anopheles punctipennis Say.**

*Culex punctipennis* Say, Journ. acad. nat. soc. Phil., iii, 9, 1823.

*Anopheles punctipennis* Blanchard, Les Moustiques, 167, 1905.

The commonest species in the Atlantic Coast region and Mississippi Valley, much commoner than *maculipennis*.

**Anopheles grabhamii Theobald.**

*Anopheles grabhamii* Theobald, Mon. Culic., i, 205, 1901.

*Cyclopepidopteron grabhamii* Blanchard, Les Moustiques, 185, 1905.

Described from Jamaica. Our specimens are from St. Domingo (Busck).

*Anopheles maculipennis* Meigen.

*Anopheles maculipennis* Meigen, Klass. Besch. eur. zweifl. Ins., i, 5, 1804.

*Anopheles maculipennis* Blanchard, Les Moustiques, 160, 1905.

Received from various parts of the United States. Occurs also in Europe.

*Anopheles eiseni* Coquillett.

*Anopheles eiseni* Coquillett, Journ. N. Y. ent. soc., x, 192, 1902.

Described from Guatemala. We have it from Cordoba, Mexico.

*Anopheles crucians* Wiedemann.

*Anopheles crucians* Wiedemann, Ausser. Zweifl. Ins., i, 12, 1828.

*Anopheles crucians* Blanchard, Les Moustiques, 171, 1905.

Occurs in the southern Atlantic States from New York to Florida.

*Anopheles pseudopunctipennis* Theobald.

*Anopheles pseudopunctipennis* Theobald, Mon. Culic., ii, 305, 1901.

Described from New Grenada, Lesser Antilles. Our specimens are from Acapulco and Salina Cruz, Mexico. We assume them to be correctly named, although the localities are rather remote.

## Genus COELODIAZESIS, new.

Differs from *Anopheles* in the slight developement of the head hairs, the presence of plumose hairs after the third abdominal segment, and the absence of short teeth on the comb of the eighth segment. Type, *C. barberi* Coq.

*Coelodiazesis barberi* Coquillett.

*Anopheles barberi* Coquillett, Can. ent., xxxv, 310, 1903.

*Anopheles barberi* Dyar, Journ. N. Y. ent. soc., xii., 243, 1904.

The larvæ live in the water in hollow trees. This habit is unique among the Anopheliinæ, which are in general surface feeders in open water. As a compensation for the restricted surface offered in their habitat, the larvæ have acquired a predaceous habit and devour the unfortunate larvæ of *Aedes triseriatus* and *Mansonia signifer* with which they live.



## Subfamily CULICINÆ.

## Table of genera.

1. Mouth brush prehensile, folded outward in a pencil.....2  
Mouth brush vibratile, diffusely folded inward.....4
2. A lateral plate on the eighth abdominal segment.....*Megarhinus*  
A lateral patch of scales on the eighth abdominal segment.....3
3. Scales of the 8th segment in a line preceded by a patch of minute ones.  
*Psorophora*  
Scales alike, in a triangular patch without small ones.....*Lutzia*
4. Air tube long, the hairs in scattered tufts or absent, the antennæ  
usually with the tuft beyond the middle arising from a notch.....5  
Air tube short, less than four times as long as wide, or if longer  
the antennæ with the tuft at or before the middle.....7
5. Anal segment without hairs before the barred area.....6  
Anal segment with hairs along ventral line, piercing the chitinous band  
*Culicella*
6. Lateral comb of the 8th segment of many scales in a triangular patch *Culex*  
Lateral comb of the 8th segment a single row of bar-like spines *Mochlostyrax*
7. Air tube strongly inflated.....*Janthinosoma*  
Air tube not conspicuously inflated.....8
8. Antenna strongly inflated and distorted.....*Ceratocystia*  
Antennæ not so.....9
9. Head normal, without lateral angular projection.....10  
Head with lateral projection covering a process on the mandible.....  
*Deinocerites*
10. Head with large thick spinous setæ.....*Uranotænia*  
Head with normal fine hairs.....11
11. Seventh abdominal segment with a dorsal plate; tube without pecten  
*Mansonia*  
Abdomen without plates; air tube with pecten.....12
12. Air tube conical or tapered, normal.....13  
Air tube bottle-shaped, the outer half narrow.....*Tæniorhynchus*
13. Air tube pecten produced into long hairs.....*Culiseta*  
Air tube with the pecten not so produced.....*Aedes*

## Genus MEGARHINUS Desvoidy.

*Megarhinus* Desvoidy, Mem. soc. d'hist. nat. Paris, iii, 412, 1827.

*Megarhinus* Blanchard, Les Moustiques, 220, 1905.

## Table of species.

1. Large species, the chitinized parts very dark.....*portoricensis*  
Smaller species, the chitinized parts very pale.....*violaceus*

*Megarhinus portoricensis* von Röder.

*Megarhina portoricensis* von Röder, Stett. ent. Zeit., xlv, 337, 1885.

*Megarhinus rutila* Coquillett, Can. ent., xxviii, 44, 1896.



We are unable to distinguish the larvæ of *portoricensis* and *rutila*, which occur together, and conclude that there is but one species, the degree of white banding on the tarsi of the adults being probably variable. The larvæ inhabit hollow trees and similar artificial situations. They are exclusively carnivorous in their diet, devouring the larvæ of the other Culicinæ with which they live. Mr. Busck has noted that they kill all the larvæ that are with them before pupation. We have the species from the southern Atlantic States, West Indies and Central America. A specimen from Guadeloupe (Busck) was named "*M. violaceus*," but the adult was in poor condition.

***Megarhinus violaceus* Wiedemann.**

*Culex violaceus* Wiedemann, Dipt. exot., i, 7, 1821.

We accept this determination with some hesitation for some very pale colored larvæ of normal structure taken from the leaves of Bromelias by Mr. Urich in Trinidad. The species was described from Bahia (Brazil), but is insufficiently known, as stated by Blanchard. We would note that Dr. Lutz has recently described two *Megarhinus* bred from Bromelia water, one in Bahia, the other in Rio Janeiro. We are surprised that there should be several species with this limited habitat, and suspect the possibility of variability in the adults, as in the foregoing species.

**Genus PSOROPHORA Desvoidy.**

*Psorophora* Desvoidy, Mem. soc. d'hist. nat. Paris, iii, 412, 1827.

*Psorophora* Blanchard, Les Moustiques, 237, 1905.

*Table of species.*

1. Air tube less than three times as long as wide; a single tuft almost at tip  
*cilipes*  
 Air tube four times as long as wide; a single hair shortly beyond the pecten.....2
2. Labial plate with the teeth regular and subequal.....*ciliata*  
 Labial plate with the next to basal tooth greatly enlarged.....*howardii*

***Psorophora cilipes* Fabricius.**

*Culex cilipes* Fabricius, Syst. Antliat., 34, 1805.

*Culex cilipes* Blanchard, Les Moustiques, 373, 1905.

We have accepted this identification for some very distinct larvæ taken by the junior author in Puntarenas, Costa Rica. Blanchard

includes the name in his list of uncertain or indeterminable species, but Coquillett is apparently able to recognize it. The larvæ occurred in a temporary pool full of vegetation, together with many Culicid larvæ on which they were feeding.

***Psorophora ciliata* Fabricius.**

*Culex ciliatus* Fabricius, Ent. Syst., iv, 401, 1794.

*Culex molestus* Wiedemann, Dipt. exot., i, 36, 1821.

*Psorophora boscai* Desvoidy, Mem. soc. d'hist. nat. Paris, iii, 413, 1827.

*Culex conterrens* Walker, Ins. Saund., Dipt., i, 427, 1856.

*Culex perterrens* Walker, Ins. Saund., Dipt., i, 431, 1856.

*Psorophora ciliata* Blanchard, Les Moustiques, 239, 1905.

The species occurs in the Atlantic seaboard as far North as Massachusetts, and is common locally at Baltimore and Washington. The larva occurs in temporary rain puddles, hatching immediately after a shower. It is predaceous and very voracious. The principal prey are the species of *Janthinosoma*.

***Psorophora howardii* Coquillett.**

*Psorophora howardii* Coquillett, Can. ent., xxxiii, 258, 1901.

Occurs on the Atlantic and Gulf coasts, but does not extend its range so far to the North as *ciliata*. The habits are the same and the two species occur mixed in the same puddles. The larvæ are very similar. In Mexico, the junior author found *howardii* considerably more abundant than *ciliata*, while in Central America *howardii* occurred alone.

**Genus LUTZIA Theobald.**

*Lutzia* Theobald, Mon. Culic., iii, 155, 1903.

***Lutzia bigotii* Bellardi.**

*Culex bigotii* Bellardi, Mem. d. R. accad. di Torino, xxi, 200, 1864.

*Culex bigotii* Blanchard, Les Moustiques, 275, 1905.

*Lutzia bigotii* Blanchard, Les Moustiques, 394, 1905.

This interesting larva has the predaceous habits of *Psorophora* and in the main agrees structurally therewith; but in the less degree of modification of the maxillæ, lateral comb of the eighth segment and pecten of the tube, retains more of the structural characters of the other Culicid genera. The junior author collected it at Cordoba,

Mexico, and it has been sent us from Las Cascadas in the Panama Canal zone by Dr. J. A. LePrince.

Genus JANTHINOSOMA Arribalzaga.

*Janthinosoma* Arribalzaga, Rev. del Mus. de La Plata, ii, 152, 1891.

*Conchyliastes* Coquillett in Howard, Mosquitoes, 234, 1901.

*Feltidia* Dyar, Proc. ent. soc. Wash., vii, 47, 1905.

*Ianthinosoma* Blanchard, Les Moustiques, 231, 1905.

Table of species.

- |   |                     |
|---|---------------------|
| 1. Antennæ long and prominent, longer than the head .....   | 2                   |
| Antennæ moderate or short, shorter than the head .....  | 5                   |
| 2. Anal segment long and slender, longer than wide .....  | 3                   |
| Anal segment short, shorter than wide .....   | 4                   |
| 3. Comb of the eighth segment of six or seven subequal spines .....   | <i>sayi</i>         |
| Comb of five spines, the upper and lower ones small .....   | <i>varipes</i>      |
| 4. Pecten teeth of the air tube with four long sharp spines .....   | <i>infine</i>       |
| Pecten teeth of the air tube with two reduced rounded branches ..   | <i>scholasticus</i> |
| 5. Tube fusiform-inflated; teeth of comb joined by a chitinous band .....                                   | 6                   |
| Tube barrel-shaped; teeth of comb separate .....  | <i>pygmæa</i>       |
| 6. Antennæ black on outer half; four spines of tube pecten scattered to the<br>basal half of the tube ..... | <i>jamaicensis</i>  |
| Antennæ all white; the four spines of the tube pecten restricted to the<br>basal third of the tube .....    | <i>signipennis</i>  |

*Janthinosoma sayi*, new name.

*Culex musicus* Say (not Leach), Proc. acad. nat. sci. Phil., vi, 149, 1827.

*Ianthinosoma mexicana* Blanchard, Les Moustiques, 234, 1905.

The larva is found in temporary rain puddles and develops rapidly, as do all of this genus. It occurs along the Atlantic seaboard as far North as Massachusetts, but is common only further South. The senior author met with it in abundance at Tampa, Florida. The junior author collected it at Santa Lucrecia, Almoloya and Tehuantepec, Mexico; Sonsonate, Salvador; Corinto, Nicaragua; Puntarenas and Port Limon, Costa Rica. Blanchard says that *musicus* Say (preoccupied) is surely the same as *mexicanus* Bellardi; but Coquillett has identified as *mexicana* another species, which he refers to "*Culex*" as it differs in scale structure. We therefore propose the new name *sayi* for our familiar species.

*Janthinosoma varipes* Coquillett.

*Conchyliastes varipes* Coquillett, Can. ent., xxxvi., 10, 1904.

*Ianthinosoma varipes* Blanchard, Les Moustiques, 626, 1905.

Described from Mexico and Mississippi. Our larvæ are from Baton Rouge, Louisiana, from Dr. Dupree.

*Janthinosoma infine*, new species. Fig. 1.

The characters are normal for the genus. The antennæ are greatly developed, the anal segment short, the scales of the lateral comb of the eighth segment are joined by a very weak chitinous band; the single scale has its apical spinule long. The larvæ were collected by Mr. Busek in Trinidad and St. Domingo in rain water pools and ditches, in a spring in a cave, in a slowly running spring, in a pot-hole in coral rock in the woods, in a pot-hole near the coast with rather salt water and in holes made by wild pigs in the San Francisco Mts. of St. Domingo. The specimens have been named '*Culex confinis*,' but *confinis* was described by Arribalzaga from the Argentine and is referred by Blanchard to *Tæniorkynchus*; so we do not accept the identification.

*Janthinosoma scholasticus* Theobald. Fig. 2.

*Culex scholasticus* Theobald, Mon. Culic., ii, 120, 1901.

*Culex scholasticus* Blanchard, Les Moustiques, 336, 1905.

Described from the Antilles. Our specimens are from Trinidad, taken by Mr. Busek in rain water pools at Cedros, with the preceding species. We have accepted this identification, although it is perhaps open to some doubt, as Mr. Coquillett later applied this same name (*scholasticus*) to a very different species, collected by the junior author in Central America, which same species he had also named "*secutor* Theob." Not, however, the true *secutor* Theob. of Jamaica, of which we have specimens from Dr. Graham. (See *Culex lactator* and *C. coronator* described below).

*Janthinosoma pygmaea* Theobald. Fig. 3.

*Grabhamia pygmaea* Theobald, Mon. Culic., iii, 245, 1903.

Described from Antigua and Jamaica. Our specimens were taken by Mr. Busek in St. Domingo in pools in coral rock close to the sea, filled with clear salt water, only submerged by the highest tides. We have accepted the determination because we do not know but that Theobald's specimens came from larvæ with the same peculiar habits as ours; this is not stated, and we give the matter the benefit of the doubt.

***Janthinosoma jamaicensis* Theobald.**

*Culex jamaicensis* Theobald, Mon. Culic., i, 345, 1901.

*Grabhamia jamaicensis* Theobald, Mon. Culic., iii, 244, 1903.

*Culex jamaicensis* Blanchard, Les Moustiques, 279, 1905.

*Grabhamia jamaicensis* Blanchard, Les Moustiques, 397, 1905.

Recorded from Jamaica only. We have before us a widespread species, common along the Atlantic seaboard, taken by Mr. Busck on St. Domingo and by the junior author in Santa Lucrecia, Rincon Antonio, Tehuantepec, Salina Cruz and Almoloya, Mexico. It was formerly named "*perturbans* Walk." by Mr. Coquillett, then changed to "*confinis* Arrib." under which name a figure of the larva was published by the senior author (see Blanchard, Les Moustiques, p. 297), and lastly named *jamaicensis* Theob. We accept this name, although lacking the positive identification of larvæ from Jamaica.

***Janthinosoma signipennis* Coquillett.**

*Tæniorhynchus signipennis* Coquillett, Proc. ent. soc. Wash., vi, 167, 1904.

*Tæniorhynchus signipennis* Dyar, Journ. N. Y. ent. soc., xii, 244, 1904.

Described from Monterey, Mexico. Our larvæ are from Laredo, Texas, bred by Dr. Berry.

**Genus CERATOCYSTIA, new.**

Characterized by the greatly enlarged, bent antennæ, which have two of the apical spines far removed from the tip. The larva is allied to *Janthinosoma*, except that the tube is not inflated. This is apparently compensated for by the enlargement of the antennæ. Type, *C. discolor* Coq.

***Ceratocystia discolor* Coquillett.**

*Culex discolor* Coquillett, Can. ent., xxxv, 256, 1903.

*Culex discolor* Smith, Ent. news, xv, 147, 1904.

*Culex discolor* Dyar, Journ. N. Y. ent. soc., xii, 173, 1904.

*Culex discolor* Felt, Bull. 70, N. Y. Sta. Mus., 297, 1904.

*Culex discolor* Smith, Agr. Exp. Sta. N. J., Rept. Mosq., 193, 1905.

Described from New Jersey. The species occurs sparingly along the Atlantic seaboard and has been taken by the junior author at Tehuantepec, Mexico. The larvæ occur in temporary rain puddles in company with *Janthinosoma* and *Psorophora*. The eggs are spinose, as in those genera. All these spinose eggs seem adapted to lie in dried ground and hatch immediately after a shower. The development of the larva is rapid.



Genus *TÆNIORHYNCHUS* Arribalzaga.

*Tæniorhynchus* Arribalzaga, Rev. del Mus. de La Plata, ii, 147, 1891.

*Coquillettidia* Dyar, Proc. ent. soc. Wash., vii, 47, 1905.

*Tæniorhynchus* Blanchard, Les Moustiques, 381, 1905

*Tæniorhynchus perturbans* Walker.

*Culex perturbans* Walker, Ins. Saund., i, 428, 1856.

*Culex perturbans* Dyar & Currie, Proc. ent. soc. Wash., vi, 218, 1904.

*Tæniorhynchus perturbans* Blanchard, Les Moustiques, 386, 1905.

The mature larva is undiscovered and its habits remain a mystery. Several excellent collectors searched for it in vain. Professor J. B. Smith had masses of *Spirogyra* examined, but without result, as he tells us. The young larva obtained from eggs has been described, but failed to feed. The peculiarities of habit, whatever they may be, which have rendered this species undiscoverable are evidently common to the other members of the genus, for Professor Goeldi in Brazil (Os Mosq. no Para, 107, 1905) has exactly repeated our experience with *T. fasciolatus* Arrib. and *T. arribalzaga* Theob., and his first stage larvæ agree structurally with ours. The antennæ are excessively long and the air tube is roundedly narrowed at the middle, the distal half being slender and resembles a thick spine. The tip is armed with hooks.

Genus *MANSONIA* Blanchard.

*Panoplites* Theobald (not Gould), Journ. Trop. Med., iv, 229, 1901.

*Mansonia* Blanchard, Cont. rend. heb. Soc. Biol., liii, 1045, 1901.

*Pneumaculex* Dyar, Proc. ent. soc. Wash., vii, 46, 1905.

*Tæniorhynchus* Dyar (not Arribalzaga), Proc. ent. soc. Wash., vii, 47, 1905.

We are unacquainted with the larva of the typical species of *Mansonia* (*titillans* Walk.) and if it should prove to be different in structure,\* the name *Pneumaculex* is available for the forms here associated. The senior author has shown that the genus should be called *Tæniorhynchus* if the rule of first species be accepted in determining the type.

*Table of species.*

1. Plate on the sixth abdominal segment a dorsal saddle; no plate on the eighth segment below the comb..... *signifer*

\*We are almost certain that this will prove to be the case. Goeldi figures the eggs of *titillans* (Os Mosq. no Para. 114, 1905), which have nothing in common with those of the species here treated, but are of the type of an *Aedes*.



Plate on the sixth segment reaching to the middle of the side; a plate on the eighth segment below the comb ..... *fascipes*

***Mansonia signifer* Coquillett.**

*Culex signifer* Coquillett, Can. ent., xxviii, 43, 1896.

*Stegomyia signifer* Theobald, Mon. Culic., i, 322, 1901.

*Culex signifer* Smith, Ent. news, xi, 26, 1903.

*Culex signifer* Dyar, Journ. N. Y. ent. soc., xi, 26, 1903.

*Culex signifer* Smith, N. J. Agr. exp. Sta., Bull. 79., 338, 1904.

*Stegomyia signifer* Blanchard, Les Moustiques, 258, 1905.

*Culex ? signifer* Ludlow, Med. Record, N.Y., Jan. 20, 1906.

The larva is a normal inhabitant of the water in hollow trees. It occurs also in similar artificial situations, such as rain barrels, and is rather widely distributed in the United States. The peculiar dorsal platings on the abdomen appear only in the last stage, but the larva is recognizable in all stages by the absence of pecten on the air tube. The tracheal tubes are expanded into bladders in the thorax. The eggs are deposited at the water line and adhere firmly to the side of the vessel. They are covered by a peculiar veil, marked by radial folds.

***Mansonia fascipes* Coquillett.**

*Mansonia fascipes* Coquillett. Proc. ent. soc. Wash., vii, 182, 1906.

We have received these peculiar larvæ from Mr. F. W. Urich from Trinidad, who communicates the following notes. "The predominating colour of these larvæ is red; when young the pigment is pale on the dorsal anterior half of each segment of thorax and abdomen and gets lighter, until a white ring is formed at the joint with the next segment, thus giving the larva a red and white ringed appearance. This coloration is maintained right through all stages of the larva. At each change of skin the red color gets more intense, until the mature larva has a rather dark appearance. The pupa also has a reddish tint showing through the brown coloration. The larvæ live in bamboo joints, the water in which teems with infusoria, small worms and other micro-organisms. It would appear as if this fauna is essential to their well-being, for if isolated too young they die or do not mature well. The larval period seems to take a long time." Mr. F. C. Pratt has observed a similar red coloration in the larvæ of *signifer*, but we had heretofore attributed to it a pathological significance. Probably it is normal to the genus.

## Genus URANOTAENIA Arribalzaga.

*Uranotænia* Arribalzaga, Rev. del Mus. de La Plata, ii, 163, 1891.

*Uranotænia* Blanchard, Les Moustiques, 406, 1905.

*Uranotænia* Mitchell, Journ. N. Y. ent. soc., xiv, 8, 1906.

Our species are in a very unsatisfactory state, but the paucity of our present material does not enable us to remedy it. Miss Mitchell has given a table of the species identified from the United States and Dr. Grabham figures the two Jamaican species. We have another from Mr. Ulrich in Trinidad and the junior author collected one in Mexico. The following table, as compiled, appears to show that the continental forms identified as *socialis* and *lowii* are not conspecific with the insular forms, and we have no recourse but to rename them, although we would much prefer to have good material for actual comparison.

*Table of species.*

- |  |                   |
|--|-------------------|
| 1. Antennæ without spines; longest terminal seta as long as antenna.....   | <i>geométrica</i> |
| Antennæ with scattered spines; longest terminal seta shorter than antenna... 2                                       |                   |
| 2. Terminal setæ three, the short one obsolete..... 3  |                   |
| Terminal setæ four..... 4  |                   |
| 3. Shaft rather numerously spined; terminal digit simple..... <i>lowii</i>   |                   |
| Shaft with but two spines; terminal digit double..... <i>coatzacoalcos</i>   |                   |
| 4. Antennæ with the hair beyond the basal third..... <i>continentalis</i>  |                   |
| Antennæ with the hair at about the basal third..... 5  |                   |
| 5. Pedicellate digit double, the two forks about equal in length..... 6  |                   |
| This digit large and single, the second digit small and arising below the apex of the pedicel..... <i>sapphirina</i> |                   |
| 6. Shortest spine a lanceolate blade; apical tooth of labial plate broad and flat..... <i>socialis</i>               |                   |
| Shortest spine slender, filiform; apical tooth of labial plate triangularly pointed..... <i>coquilletti</i>          |                   |

*Uranotænia lowii* Theobald.

*Uranotænia lowii* Theobald, Mon. Culic., ii, 339, 1901.

*Uranotænia lowii* Grabham, Can. ent., xxxvii, 401, 1905.

Described from Santa Lucia. We accept Dr. Grabham's definition of Jamaican specimens rather than Mr. Coquillett's determination of those from Louisiana.

*Uranotænia coatzacoalcos*, new species.

The antennæ are stout with a single stout hair at basal third and two short spines on the other side; at tip two long hairs, not as long

as the antennæ, a short one and a sharp angle; a long double blade-like digit that appears to be divided to the base, one part dark and about two-thirds as long as the longer pale portion.

The larvæ were collected by the junior author at Santa Lucrecia, Mexico, in the valley of the river Coatzacoalcos. They were not bred. The larvæ occurred in a ditch full of vegetation.

*Uranotænia continentalis*, new species.

Sent to Miss Mitchell by Dr. Dupree from Baton Rouge, Louisiana, and identified as "*Uranotænia lowii* Theob." The characters are indicated in the table.

*Uranotænia sapphirina* Osten-Sacken.

*Aedes sapphirinus* Osten-Sacken, Trans. Am. ent. soc., ii, 47, 1868.

*Uranotænia sapphirina* Blanchard, Les Moustiques, 407, 1905.

Not uncommon in permanent swamps or ponds. We have it from New Hampshire and New York. The larva looks like an *Anopheles* with a long tube, owing to its position in the water and shape of the head.

*Uranotænia geometrica* Theobald.

*Uranotænia geometrica* Theobald, Mon. Culic., ii, 247, 1901.

Described from Santos, Brazil. Our specimens are from Mr. F. W. Urich in Trinidad, who collected them in a small puddle in a drain. The water was covered with green algæ. Mr. Urich says that the larvæ reminded him at first sight of *Anopheles albipes*. They were colored green, from algæ, no doubt. We have accepted the determination rather because we have no means of disproving it, than that we feel any confidence in its accuracy.

*Uranotænia socialis* Theobald.

*Uranotænia socialis* Theobald, Mon. Culic., ii, 340, 1901.

*Uranotænia socialis* Grabham, Can. ent., xxxvii, 403, 1905.

Described from Jamaica. Dr. Grabham has made known the larva with a description and figure.

*Uranotænia coquilletti*, new species.

Near *socialis* Theob., but differentiated by the characters given in the table. Dr. Dupree sent the specimens to Miss Mitchell and Mr.

Coquillett named them "*Uranotania socialis* Theob." We dedicate the species to Mr. Coquillett, who has certainly performed a vast amount of labor on a difficult subject, whatever we may think of his results.

**Genus DEINOCERITIES Theobald.**

- Deinocerites* Theobald, Mon. Culic., ii, 215, 1901.  
*Brachiosoma* Theobald, Journ. Trop. med., iv, 229, 1901.  
*Brachiomysia* Theobald, Mon. Culic., ii, 343, 1901.  
*Deinokerides* G'ès, Handb. Gn. or Mosq., 472, 1902.  
*Diinocerites* Blanchard, Les Moustiques 413, 1905.

***Deinocerites cancer* Theobald.**

- Deinocerites cancer* Theobald, Mon. Culic., ii, 215, 1901.  
*Deinocerites cancer* Theobald, Mon. Culic., iii, 279, 1903.  
*Deinocerites cancer* Dyar, Journ. N. Y. ent. soc., xiii, 27, 1904.  
*Diinocerites cancer* Blanchard, Les Moustiques, 414, 1905.

The now well-known inhabitant of crab holes at high water mark along the sea shore of southern Florida and the Antilles. We have specimens from Dr. Grabham from Jamaica and it was collected in southern Florida by the senior author and Mr. Caudell. Descriptions have been published.

**Genus AEDES Meigen.**

- Aedes* Meigen, Syst. beschr. bek. eur. Zweifl. Ins., i, 13, 1818.  
*Ochlerotatus* Arribalzaga, Rev. del Mus. de La Plata, ii, 146, 1891.  
*Hæmagogus* \*Williston, Trans. ent. soc. Lond., 271, 1896.  
*Stegomyia* Theobald, Mem. Liverp. Sch. Trop. Med., iv, App., iii, 1901.  
*Grabhamia* Theobald, Mon. Culic., iii, 243, 1903.  
*Howardina* Theobald, Mon. Culic., iii, 287, 1903.  
*Verrallina* Theobald, Mon. Culic., iii, 295, 1903.  
*Culicidsa* Felt, Bull. 79, N. Y. Sta. Mus., 391 b, 1904.  
*Culicada* Felt, Bull. 79, N. Y. Sta. Mus., 391 b, 1904.  
*Ecculex* Felt, Bull. 79, N. Y. Sta. Mus., 391 c, 1904.  
*Protoculex* Felt, Bull. 79, N. Y. Sta. Mus., 391 d, 1904.  
*Pseudoculex* Dyar, Proc. ent. soc. Wash., vii, 47, 1905.  
*Gymnomctopa* Coquillett, Proc. ent. soc. Wash., vii, 183, 1906.  
*Lepidoplatus* Coquillett, Science, n. s., xxiii, 314, 1906.

\*The genus *Hæmagogus* may perhaps be recognized on the larval character of a small triangular chitinous plate on each side of the ventral brush of the last segment, the segment being not ringed. If so, it will take *Howardina* and *Gymnomctopa* as synonyms, and include the species *cyaneus* Fab., *philosophicus* D. & K., *walkeri* Theob., *albonotata* Coq., *busckii* Coq. and *mediovittata* Coq.

In this group the antennæ are moderate or small; the tuft is always at or before the middle; the air tube is short, three times as long as wide or less and carries a single tuft beyond the pecten. A few species vary in having a more elongate tube and one has multiple tufts. The anal segment is generally not encircled by the chitinous plate, but this occurs in some species.

*Table of species.*

1.	Air tube with the hair tuft within the pecten .....	2
	Air tube with the tuft beyond the pecten .....	8
2.	Anal segment ringed by the plate .....	3
	Anal segment with the ring broken on the ventral line .....	6
3.	Lateral comb of the eighth segment of few scales in a row.....	<i>tormentor</i>
	Lateral comb of the eighth segment many scales in a triangular patch. ....	4
4.	Pecten of the air tube with detached teeth outwardly.....	<i>bimaculatus</i>
	Pecten of the air tube with the teeth evenly spaced.....	5
5.	Ring of the anal segment narrow; pecten of tube not to the middle.....	<i>janitor</i> *
	Ring of anal segment broad; pecten beyond middle.....	<i>lactator</i> *
6.	Comb of few spines in an irregular row; tube with several tufts.....	<i>trichurus</i>
	Comb of long spines in a straight row; pecten running to apex.....	<i>walkeri</i>
	Comb a patch of scales; tube with one hair tuft.....	7
7.	Pecten with detached teeth; abdominal hairs normal.....	<i>atropalpus</i>
	Pecten evenly spaced; short abdominal hairs stellate.....	<i>busckii</i>
8.	Pecten of the air tube with detached teeth outwardly.....	9
	Pecten of the air tube with evenly spaced teeth.....	13
9.	Air tube 4 x 1; comb a patch of scales three rows deep.....	<i>abfitchii</i>
	Tube 3 x 1 or less; comb of few scales in an irregularly double row.....	10
10.	Antennæ enlarged basally, large, tuft rather beyond the middle.....	<i>aurifer</i>
	Antennæ moderate only; tuft before the middle.....	11
11.	The two rows of pecten on the tube approximate behind dorsal plate of anal segment a saddle only.....	<i>impiger</i>
	Two rows of pecten well separated; dorsal plate over half encircling the segment.....	12
12.	Tuft of tube before outer third; anal processes blunt.....	<i>sylvestris</i>
	Tuft of tube beyond outer third; anal processes pointed.....	<i>fuscus</i>
13.	Comb scales few, in a single or irregularly single row.....	14
	Comb scales more numerous to many in a patch.....	20
14.	Anal segment ringed by the plate.....	15
	Anal segment not ringed, at least a small space along ventral line.....	18
15.	Anal processes moderate, normal.....	16
	Anal processes very long with a stout wavy central trachea.....	<i>dupreei</i>
16.	Comb of six scales; pecten not reaching half of tube.....	17
	Comb of 12 scales; pecten reaching half of tube.....	<i>meridionalis</i>

\*Treated under *Culex*, q. v.



17. Pecten of air tube running about one-third; anal segment wider than long..... *punctor*  
Pecten of air tube running about one-half; anal segment longer than wide..... *atlanticus*
18. Comb scales smooth or nearly so, bluntly rounded ..... 19  
Comb scales sole-shaped with trifid apex ..... 20  
Comb scales long, pointed, thorn-shaped ..... *philosophicus*
19. Short abdominal hairs normal; anal plate smooth ..... *triseriatus*  
Short abdominal hairs stellate; anal plate spined behind..... *albonotata*
20. Air tube pecten small, in a straight row..... *calopus*  
Air tube pecten long, strongly spiral..... *mediovitata*
21. Anal segment ringed by the plate..... 22  
Anal segment not ringed by the plate..... 31
22. Air tube over twice as long as wide, its pecten of 19-22 teeth..... 23  
Air tube twice as long as wide or less, pecten of 12-14 teeth..... 26
23. Scales of comb with central spine shorter than the body of the scale; pecten of the air tube of equal teeth..... 24  
Scales of comb with central spine as long as body of scale; pecten of air tube longer outwardly..... 25
24. Air tube two-and-a-half times as long as wide; comb scales moderate, thorn-shaped..... *sollicitans*  
Air tube 3 x 1; comb scales long thorn-shaped..... *mittchelle*
25. Air tube pecten to beyond middle of tube; comb of 21 scales in nearly three rows..... *trivittatus*  
Pecten not to middle of tube; comb of 17 scales in two imperfect rows *auroides*
26. Scales of comb feathered on the sides with central thorn; pecten reaching half the length of tube; body glabrous..... *infirmatus*  
Scales of comb evenly spinulated without central thorn..... 27
27. Body glabrous..... *inconspicuus*  
Body pilose..... 28
28. Pecten to four-fifths of tube; tuft almost apical..... *hemisurus*  
Pecten scarcely over half of tube; tuft normal..... 29
29. Lateral hairs single on third to fifth abdominal segments..... *cuplocamus*  
Lateral hairs double or in threes on these segments..... 30
30. Anal segment short with narrow chitinous ring ..... *damnosus*  
Anal segment moderate with broad ring ..... *habanæus*
31. Tube long, 4 x 1; tracheæ narrow, angled..... *fitchii*  
Tube three times as long as wide or less..... 32
32. Anal plate small, not covering more than half of the segment; anal gills very large, sac-like, spotted..... *varipalpus*  
Anal plate covering more than half the segment; anal gills moderate .... 33
33. Comb scales tapered, a single median spine stouter or longer, differentiated from the rest ..... 34  
Comb scales bluntly ended, the median spine resembling the others.... 40
34. Both median head tufts multiple..... 35  
Lower head tuft single or double (rarely three)..... 37



35. Subdorsal prothoracic hairs single.....	<i>canadensis</i> <i>nivitaris</i>
Subdorsal prothoracic hairs multiple.....	36
36. Weakly colored; tufts of ventral brush short-stemmed.....	<i>cantator</i>
Darkly colored; tufts of ventral brush long stemmed.....	<i>pullatus</i>
37. Lower head hair double (or three).....	38
Lower head hair single.....	39
38. Comb scales with the lateral spines as long as the apical one.....	<i>grossbecki</i>
Comb scales with the lateral spines very short.....	<i>pretans</i>
39. Apical spine of the comb scales sharp and distinct.....	<i>festivalis</i>
Apical spine of the comb scale subequal to the others.....	<i>subcantans</i>
40. Antennae very long and slender.....	<i>laternaria</i>
Antennae normal, short, stout.....	41
41. Antennae spinulated.....	42
Antennae smooth, the spinules obsolete.....	43
42. Anal gills normal, moderate.....	<i>lazarensis</i>
Anal gills very short, bud-shaped.....	<i>quaylei</i>
43. Air tube conic-tapered; pecten long, very dense, slightly spiral; the secondary hairs normal.....	44
Air tube cylindrical, bluntly rounded; pecten normal; short abdominal hairs stellate.....	<i>cyaneus</i>
44. Pecten followed by a single hair; labial plate low triangular with promi- nent side teeth.....	<i>knabi</i>
Pecten followed by a small tuft; labial plate long triangular with small teeth.....	<i>insolita</i>

*Aedes tormentor*, new species. Fig. 4.

This species was collected by Dr. Dupree in Baton Rouge, La., and named "*Culex serratus* Theob." as was also the species we describe as *atlanticus*. We do not believe that either of these forms are identical with the South American species, certainly they both cannot be. It is characterized in the table above.

*Aedes bimaculatus* Coquillett.

*Culex bimaculatus* Coquillett, Proc. U. S. Nat. Mus., xxv, 84, 1902.

*Culex bimaculatus* Dyar, Journ. N. Y. ent. soc., xi, 27, 1903.

*Culex bimaculatus* Dyar, Proc. ent. soc. Wash., v, pl. 2, f. 14, 1903.

Described from Brownsville, Texas. The larvæ were discovered by Dr. Dupree at Baton Rouge, La.

*Aedes trichurus* Dyar.

*Culex trichurus* Dyar, Journ. N. Y. ent. soc., xii 169, 1904.

*Culex cinereoborealis* Felt & Young, Science, n.s., xx, 505, 1904.

*Culex cinereoborealis* Felt, Bull. 79, N. Y. Sta. Mus., 314, 1904.

*Culex trichurus* Dyar, Journ. N. Y. ent. soc., xii, 244, 1904.

This is one of the early Spring species, the larvæ of which live in the pools formed by the melting snows. They hatch from overwintering eggs and are all developed by the first of May. There is only one generation a year. The species have a northern range. Our localities for this species are Springfield, Mass. (Dimmock), Plattsburgh, N. Y. (Dyar), Kaslo, B. C. (Dyar). We have no records from further North because no collections have been made there.

*Aedes walkeri* Theobald. Fig. 5.

*Culex walkeri* Theobald, Mon. Culic., i, 424, 1901.

*Howardina walkeri* Dyar, Journ. N. Y. ent. soc., xiii, 27, 1904.

*Culex walkeri* Blanchard, Les Moustiques, 312, 1905.

*Howardina walkeri* Blanchard, Les Moustiques, 416, 1905.

We have this peculiar larva from Dr. Grabham from Jamaica. A description has been published by the senior author, which is in error in stating that the long lateral hairs are absent; they are really present, although they have been broken off nearly all the specimens.

*Aedes atropalpus* Coquillett.

*Culex atropalpus* Coquillett, Can. ent., xxxiv, 292, 1902.

*Culex atropalpus* Dyar, Ent. news, x, 195, 1902.

*Culex atropalpu*. Smith, Ent. news, xiii, 301, 1902.

*Culex atropalpus* Dyar, Proc. ent. soc. Wash., v, 144, 1903.

*Culex atropalpus* Dyar, Ent. news, xiv, 180, 1903.

*Culex atropalpus* Dyar, Journ. N. Y. ent. soc., xii, 172, 1904.

*Culex atropalpus* Felt, Bull. 79, N. Y. Sta. Mus., 306, 1904.

*Culex atropalpus* Smith, N. J. Agr. Exp. Sta., Rept. Mosq., 282, 1905.

*Culex atropalpus* Blanchard, Les Moustiques, 628, 1905.

This species ranges widely, from New Hampshire to Almoloya, Oaxaca, Mexico, where it was taken by the junior author. The only breeding places are the pot holes in rocks beside swift streams or cavities in rocks on the shores of lakes, filled by the waves during storms. It is remarkable that the species should be able to withstand the rush of water in flood, even if it be in the egg state.

*Aedes busckii* Coquillett. Fig. 6.

*Stegomyia busckii* Coquillett, Can. ent., xxxviii, 60, 1906.

Collected by Mr. Busck in Dominica and Guadeloupe. The locality given in the original description is an error.

**Aedes abfitchii Felt.**

- Culex abfitchii* Felt, Bull. 79, N. Y. sta. Mus., 381, 1904.  
*Culex abfitchii* Dyar, Journ. N. Y. ent. soc., xiii, 29, 1904.  
*Culex siphonalis* Smith & Grossbeck, Psyche, xii, 16, 1905.  
*Culex siphonalis* Smith, N. J. Agr. exp. Sta., Rept. Mosq., 245, 1905.

One of the early Spring forms with northern distribution. The senior author collected specimens in Kaslo, B. C., which were named first "*Culex cantans* Meig." and a description published under that name (Journ. N. Y. ent. soc., xii, 36, 1904). Later the determination was changed to "*Grabhamia vittata* Theob.," but it cannot possibly be that species to judge from Theobald's figure (Can. ent., xxxv, 313, 1903). The figure is too sketchy to admit of placing the form in a table, though we conjecture it to be intended for some species of *Culiseta*.

**Aedes aurifer Coquillett.**

- Culex aurifer* Coquillett Can. ent., xxxv, 255, 1903.  
*Culex aurifer* Smith, Ent. news, xv, 148, 1904.  
*Culex aurifer* Dyar, Journ. N. Y. ent. soc., xii, 172, 1904.  
*Culex aurifer* Felt, Bull. 79, N. Y. Sta. Mus., 337, 1904.  
*Culex aurifer* Dyar, Journ. N. Y. ent. soc., xii, 244, 1904.  
*Culex aurifer* Smith, N. J. Agr. exp. Sta., Rept. Mosq., 298, 1905.

One of the early Spring forms, which was discovered by Mr. J. T. Brakeley in New Jersey.

**Aedes impiger Walker.**

- Culex impiger* Walker, Cat. Dipt. Ins. Brit. Mus., i, 6, 1848.  
*Culex impiger* Felt, Bull. 79, N. Y. Sta. Mus., 316, 1904.  
*Culex impiger* Dyar, Journ. N. Y. ent. soc., xiii, 27, 1905.  
*Culex nigripes* Blanchard (in part), Les Moustiques, 345, 1905.

One of the early Spring species which was discovered by Dr. E. P. Felt in northern New York. We are not at all sure that Walker's species is determinable, but having been thus fixed by Dr. Felt, it will be better to accept it. The species referred to by the senior author as *impiger* (Proc. ent. soc. Wash., vi, 37, 1904) is *pullatus* Coq., and the forms referred to by us (Proc. ent. soc. Wash., vi, 144, 1904,) are a mixture of *pullatus* Coq. and *trichurus* Dyar. Theobald and Blanchard refer our species to the synonymy of *nigripes* Zett. of Europe; but we have as yet no evidence that any of these American species occur in Europe.

**Aedes sylvestris Theobald.**

- Culex sylvestris* Theobald, Mon. Culic., i, 406, 1901.  
*Culex cantans* Dyar (not Meigen), Proc. ent. soc. Wash., v, 47, 142, 1902.  
*Culex sylvestris* Smith, Ent. News, xiii, 303, 1902.  
*Culex sylvestris* Dyar, Science, n. s., xvi, 672, 1902.  
*Culex sylvestris* Smith, Rept. ent. Dept. N. J. Agr. exp. Sta., 540, 1903.  
*Culex sylvestris* Johannsen, Bull. 68, N. Y. Sta. Mus., 422, 1903.  
*Culex sylvestris* Smith, Bull. 171, N. J. Agr. exp. Sta., 25, 1904.  
*Culex sylvestris* Felt, Bull. 79, N. Y. Sta., Mus., 291, 1904.  
*Culex sylvestris* Smith, N. J. Agr. exp. Sta., Rept. Mosq., 251, 1905.  
*Culex montcalmi* Blanchard, Les Moustiques, 307, 1905.

Probably the most generally abundant mosquito of the Atlantic region, breeding all Summer. It is a woods mosquito, the larvæ living in temporary rain pools. Near Washington, a large brood of *sylvestris* hatches in the early pools but it occurs also later after heavy rains. The eggs hibernate, scattered in the mud.

Prof. Blanchard has changed the name on the ground that *sylvestris* Theobald is preoccupied by *silvestris* Ross; but besides the slightly different spelling, Ross' name is said to be a "nomen nudum" and we therefore do not think that the change is required by the rules.

**Aedes fuscus Osten-Sacken.**

- Aedes fuscus* Osten-Sacken, Bull. U. S. Surv., iii, 191, 1877.  
*Aedes fuscus* Dyar, Journ. N. Y. ent. soc., x, 197, 1903.  
*Aedes fuscus* Dyar, Proc. ent. soc. Wash., v, 145, 1903.  
*Aedes fuscus* Felt, Bull. 79, N. Y. Sta. Mus., 340, 1904.  
*Aedes fuscus* Smith, N. J. Agr. exp. Sta., Rept. Mosq., 335, 1905.  
*Aedes fuscus* Blanchard, Les Moustiques, 402, 1905.

This occurs with the preceding and has the same habits, though the distribution is more northern. We have not taken it around Washington.

**Aedes punctor Kirby.**

- Culex punctor* Kirby, Faun. Bor.-Am., iv, 308, 1837.  
*Culex punctor* Dyar, Proc. ent. soc. Wash., vi, 39, 1904.  
*Culex aberratus* Felt & Young, Science, N. S., xx, 505, 1904.  
*Culex punctor* Dyar, Journ. N. Y. ent. soc., xii, 169, 245, 1904.  
*Culex punctor* Blanchard, Les Moustiques, 359, 1905.

One of the early Spring forms, all of which have similar habits and distribution. We have little idea that this is the species actually in-

tended by Kirby, but just what that was will probably never be known, and this species will do as well as another to represent the name. It is a distinct and easily recognized larva and comes very early. We got them near Springfield, Mass. in a marsh still containing ice, on which we stood to collect them and beneath which the larvæ retreated.

*Aedes meridionalis*, new species. Fig. 7.

Antennæ with the tuft before the middle; head hairs single; lateral hairs single after the second abdominal segment. Air tube 2 x 1, pecten short, reaching over one-half, followed by a large hair tuft; comb of twelve scales in a straight row. Anal segment broadly ringed.

Taken by the junior author in the forest beyond settlement, Las Loras, near Puntarenas, Costa Rica, in a pond choked by vegetation which is dry in the dry season. The specimen was named "*Janthin-osoma musica* Say" by Mr. Coquillett.

*Aedes dupreei* Coquillett.

*Culex dupreei* Coquillett, Can. ent., xxxvi, 10, 1904.

*Culex dupreei* Smith, Ent. News, xv, 49, 1904.

*Culex dupreei* Felt, Bull. 79, N. Y. Sta. Mus., 335, 1904.

*Culex dupreei* Smith, N. J. Agr. exp. Sta., Rept. Mosq., 283, 1905.

In this peculiar larva the air tube is nearly or quite functionless and it lives at the bottom among leaves. It is recorded from New Jersey and Louisiana. Mr. Buseck got it at Arima, Trinidad, in a deep virgin Palm swamp in permanent water. He says "it reminds one of a Japanese gold-fish with its very long floating tail hairs." One specimen was taken by the junior author associated with the preceding species.

*Aedes philosophicus*, new species. Fig. 8.

The characters are indicated in the table. It was collected by the junior author at Tehuantepec, Salina Cruz, Acapulco, Mexico, and Sonsonate, Salvador. The specimens were named "*Hæmagogus equinus* Theobald" by Mr. Coquillett, but we are unaware that any species has been so named. The *Culex equinus* of Linnæus and Fabricius is said to be probably a *Simulium*.

*Aedes triseriatus* Say.

*Culex triseriatus* Say, Journ. Acad. Nat. S., Phil, iii, 12, 1823.

*Culex triseriatus* Smith, Ent. news, xiii, 301, 1902.



*Culex triseriatus* Dyar, Jouru. N. Y. ent. soc., xi, 25, 1902.

*Culex triseriatus* Dyar, Science, n. s., xvi, 672, 1902.

*Culex triseriatus* Johanssen, Bull. 68, N. Y. Sta. Mus., 423, 1903.

*Culex triseriatus* Felt, Buil. 79, N. Y. Sta. Mus., 336, 1904.

*Culex triseriatus* Smith, N. J. Agr. exp. Sta., Rept. Mosq., 275, 1905.

*Culex triseriatus* Blanchard, Les Moustiques, 288, 1905.

The larva lives in holes in trees, occasionally frequenting rain water barrels, especially if placed in the woods. We have the species from all along the Atlantic coast, but only from the continent. The senior author and Mr. Caudell got it at New Smyrna, Florida, which is our southernmost record.

***Aedes albonotata* Coquillett. Fig. 9.**

*Gynometopa albonotata* Coquillett, Proc. ent. soc. Wash., vii, 183, 1906.

Collected by Mr. Busck in the San Francisco Mts. of San Domingo. They were in bamboo stalks. Mr. Busck describes them as "snaky-looking larvæ, ringed with red, pretty and distinctly marked."

***Aedes calopus* Meigen. Fig. 10.**

*Culex fasiatus* Fabricius (not Meigen), Syst. Antliat., 36, 1805.

*Culex calopus* Meigen, Syst. beschr. bek. eur. Zweifl. Ins., i, 3, 1818.

*Stegomyia fasciata* Theobald, Mem., Liverp. Sch. Trop. Med., iv, App., iii, 1901.

*Stegomyia fasciata* Howard, Mosquitoes, 135, 1901.

*Stegomyia fasciata* Dupree and Morgan, Science, n. s., xvi, 1037, 1902.

*Stegomyia fasciata* Dyar, Proc. ent. soc. Wash., v, 51, 146, 1903.

*Stegomyia fasciata* Parker, Beyer & Pothier, Bull. 13, Yellow Fev. Inst., 25, 1903.

*Stegomyia fasciata* Taylor, Le Rev. de Med., Trop., 1903.

*Stegomyia fasciata* Theobald, Mon. Culic., iii, 142, 1903.

*Stegomyia calopus* Blanchard, Les Monstiques, 249, 1905.

The well-known "yellow fever mosquito," a strictly domestic form. It was found by Mr. Busck and the junior author in nearly every town visited in the tropics. It occurs in the United States sometimes as far North as Virginia, but in March, the senior author and Mr. Caudell found it only at Key West and Miami, Florida, below the line of hard frost.

***Aedes mediovittata* Coquillett. Fig. 11.**

*Stegomyia mediovittata* Coquillett, Can. ent., xxxviii, 60, 1906.

Mr. Busck got a lot of these peculiar larvæ in San Domingo. They differ from all our species in having the pecten of the air tube strongly spirally twisted. Mr. Busck's localities are: a pot-hole in coral rock, in a coral rock cave, in a hollow trunk of a royal palm 40 feet from the ground and twice in hollow palm trunks, San Francisco Mts.



**Aedes sollicitans Walker.**

- Culex sollicitans* Walker. Ins., Saund., Dipt., i, 427, 1856.  
*Culex sollicitans* Dyar, Journ. N. Y. ent. soc., x, 197, 1902.  
*Culex sollicitans* Smith, Ent. News, xiii, pl. f. 4, 1902.  
*Culex sollicitans* Smith, Sp. Bull. N. J. Agr. Exp. Sta., July, 1902.  
*Culex sollicitans* Dyar, Proc. ent. soc. Wash., v. 47, 1902.  
*Culex sollicitans* Smith, Psyche, x, 1, 1903.  
*Culex sollicitans* Smith, Rept. ent., Dept., N. J. Agr., Exp., Sta., 515, 1903.  
*Culex sollicitans* Smith, Bull. 171, N. J. Agr. Exp. Sta., 17, 1904.  
*Culex sollicitans* Felt, Bull. 79, N. Y. Sta. Mus., 295, 1904.  
*Culex sollicitans* Smith, N. J. Agr. Exp. Sta., Rept. Mosq., 203, 1905.  
*Culex sollicitans* Blanchard, Les Moustiques, 295, 1905.

The well-known "New Jersey mosquito" breeding in the salt water marshes and pools left by high tides along the Atlantic coast from Maine to Florida. The senior author found it at New Smyrna, Florida. We do not know if it extends into the tropics.

**Aedes mitchellæ Dyar.**

- Culex mitchellæ* Dyar, Journ. N. Y. ent. soc., xiii, 74, 185, 187, 1905.

Found by the senior author and Mr. Caudell in Georgia and Florida. It is nearly allied to the preceding, but differs in habits, living in temporary rain-water puddles away from the coast.

**Aedes trivittatus Coquillett.**

- Culex trivittatus* Coquillett, Journ. N. Y. ent. soc., x, 193, 1902.  
*Culex trivittatus* Smith, Ent. News, xv, 145, 1904.  
*Culex trivittatus* Felt, Bull. 79, N. Y. Sta. Mus., 333, 1904.  
*Culex trivittatus* Smith, N. J. Agr. exp. Sta., Rept. Mosq., 288, 1905.  
*Culex trivittatus* Blanchard, Les Moustiques, 339, 1905.

Known as yet only from New Jersey. We have not personally collected the species; the credit for its discovery belongs to Prof. J.B. Smith.

**Aedes auroides Felt.**

- Culicella auroides* Felt, Bull. 79, N. Y. Sta. Mus., 449, 1905.

One of the early Spring species detected in northern New York by Dr. Felt. We have as yet no additional localities.

**Aedes infirmatus, new species. Fig. 12.**

With the characters given in the table. The specimens were obtained by Dr. Dupree at Baton Rouge, La., and determined by Mr. Coquillett as "*Culex confirmatus* Arrib." a determination which appears to us too improbable to accept.

**Aedes damnosus Say.** Fig. 13.

- Culex damnosus* Say, Jn. Acad. nat. soc. Phil., iii, 11, 1823.  
*Culex teniorhynchus* Smith (not Wiedemann), Ent. News, xiii, 300, 1902.  
*Culex teniorhynchus* Dyar, Journ. N. Y. ent. soc., xi, 13, 1903.  
*Culex teniorhynchus* Dyar, Proc. ent. soc. Wash., v, 146, 1903.  
*Culex teniorhynchus* Smith, Rept. ent. Dept. N. J. Exp. Sta., 530, 1903.  
*Culex teniorhynchus* Taylor, Rev. de Med. Trop. June, 1903.  
*Culex teniorhynchus* Smith, Bull. 171, N. J. Agr. exp. Sta., 21, 1904.  
*Culex teniorhynchus* Felt, Bull. 79, N. Y. Sta. Mus., 302, 1904.  
*Culex teniorhynchus* Smith, N. J. Agr. Exp. Sta., Rept. Mosq., 219, 1905.  
*Culex teniorhynchus* Blanchard, Les Moustiques, 291, 1905.

This species occurs along the Atlantic coast from Rhode Island to Florida. It has been identified with *teniorhynchus* Wied., described from Brazil, but we have felt too doubtful of the correctness of that to adopt the name. The larvæ inhabit pools near the sea, not necessarily salt. The senior author and Mr. Caudell found them in myriads at New Smyrna, Florida, in a large pool just across a road from salt water.

Collected by the junior author at Champerico, Mexico, in a big marsh behind the beach in brackish water; at San José de Guatemala in a puddle near the town; near Puntarenas, Costa Rica, at the head of a mangrove-lined inlet in muddy puddles.

**Aedes habanicus, new species.** Fig. 14.

Antennæ rather small with the tuft at the middle; head hairs single; body coarsely hairy; lateral hairs mostly lost, but two are present on the sixth abdominal segment; air tube two-and-a-half times as long as wide, the pecten reaching to the middle, followed by the hair tuft; anal segment broadly ringed by the plate; anal gills short, about as long as the segment.

Havana, Cuba, Oct. 28, 1903, from Mr. John R. Taylor, labelled "*Culex confirmatus* Arrib." we do not know on whose authority. They were associated with many *Psorophora ciliata*, and doubtless came from some temporary pool or swamp.

**Aedes atlanticus, new species.** Fig. 15

- Culex serratus*, Smith (not Theobald), Ent. news, xiv, 309, 1903.  
*Culex serratus*, Felt (not Theobald), Bull. 79, N. Y. sta. Mus., 334, 1904.  
*Culex serratus*, Smith (not Theobald), N. J. Agr. exp. sta., Rept. Mosq., 279, 1905.

Figured by Prof. J. B. Smith under the name "*Culex serratus* Theobald" as determined for him by Mr. Coquillett (N. J. Agr. exp.

Sta., Rept. Mosq., 280, fig 86, 1805). While it is possible that this is the true *serratus* of Theobald, described from Brazil and Guiana, we do not think it is probable, especially in view of what we note under *Aedes tormentor* above. We therefore propose a new name for the Atlantic coast form. Prof. Smith has taken it in New Jersey and the senior author at Sanford, Florida.

***Aedes inconspicuus* Grossbeck.**

*Culex inconspicuus* Grossbeck, Ent. News, xv, 313, 1904.

*Culex inconspicuus* Smith & Grossbeck, Psyche, xii, 18, 1905.

*Culex inconspicuus* Smith, N. J. Agr. Exp. Sta., Rept. Mosq., 297, 1905.

One of the Spring species detected by Mr. Grossbeck. Its range is unknown, as no other specimens have been collected.

***Aedes hemisurus*, new species.**

This is the species figured by Dr. Grabham from Jamaica (Can. ent., xxxvii, 405, 1905) as "*Culex confirmatus* Arrib.'" We do not believe that the insular form can be conspecific with the one described from the Argentine, especially as it is very different from the one identified as *confirmatus* from the United States. (See *Aedes infirmatus* above) We therefore propose a new name.

***Aedes euplocamus*, new species. Fig. 16.**

Antennal tuft small, at the middle; head hairs single. Air tube a little over 2 x 1 with even pecten of 12 teeth to the middle. Anal segment ringed; gills long, pointed, spotted.

Collected by the junior author at Zent, near Port Limon, Costa Rica, in a ditch. It was named "*Culex trivittatus* Coq." by Mr. Coquillett, but the larva disagrees.

***Aedes fitchii* Felt & Young.**

*Culex fitchii* Felt & Young, Science n. s., xx, 505, 1904.

*Culex fitchii* Felt, Bull. 79, N. Y. Sta. Mus., 282, 1904.

*Culex siphonalis* Grossbeck, Can. ent., xxvi, 332, 1904.

*Culex fitchii* Dyar, Journ. N. Y. ent. soc., xii, 246, 1904.

One of our early Spring forms with northern distribution. The larva is readily recognizable by the long tube and the narrow angled tracheæ.

***Aedes varipalpus* Coquillett.**

*Culex varipalpus* Coquillett, Can. ent., xxxiv, 292, 1902.

*Culex varipalpus* Dyar, Proc. ent. soc. Wash., vi, 40, 1904.

*Culex varipalpus* Dyar, Journ. N. Y. ent. soc., xii, 90, 1904.

*Culex viripalpis* Blanchard, Les Moustiques, 628, 1905.

A western species, probably a hollow tree feeder. The only larvæ found were in an artificial receptacle.

***Aedes canadensis* Theobald.**

*Culex canadensis* Theobald, Mon. Culic., ii, 3, 1901.

*Culex canadensis* Smith, Ent. News, xiii, 267, 1902.

*Culex canadensis* Dyar, Science, n. s., xvi, 672, 1902.

*Culex canadensis* Dyar, Journ. N. Y. ent. soc., x, 194, 1902.

*Culex canadensis* Smith, Ent. News., xiii, 300, 1902.

*Culex canadensis* Dyar, Proc. ent. soc. Wash., v, 141, 1903.

*Culex canadensis* Smith, Bull. 171, N. J. Agr. Sta., 27, 1904.

*Culex canadensis* Felt, Bull. 79, N. Y. Sta. Mus., 304, 1904.

*Culex canadensis* Smith, N. J. Agr. Exp. Sta., Rept. Mosq., 267, 1905.

*Culex canlensis* Blanchard, Les Moustiques, 316, 1905.

A very common woods species, breeding in temporary pools all Summer, most abundantly in early Spring. Its distribution is northern, although it occurs sparingly as far South as Washington, D. C., where we have taken it, and even at Jacksonville, Florida, where it was taken by the senior author and Mr. Caudell.

***Aedes nivitarsis* Coquillett.**

*Culex nivitarsis* Coquillett, Proc. ent. soc. Wash., vi, 168, 1904.

*Culex nivitarsis* Smith & Grossbeck, Psyche, xii, 14, 1905.

*Culex nivitarsis* Smith, N. J. Agr. Exp. Sta., Rept. Mosq., 229, 1905.

A species discovered by Mr. Grossbeck in New Jersey. We have not been able to separate the larva from that of *canadensis*, but that may be due to the fragmentary condition of the material.

***Aedes cantator* Coquillett.**

*Culex cantator* Coquillett, Can. ent., xxxv, 255, 1903.

*Culex cantator* Smith, Bull. 171, N. J. Agr. Exp. Sta., 22, 1904.

*Culex cantator* Felt, Bull. 79, N. Y. Sta. Mus., 293, 1904.

*Culex cantator* Dyar, Journ. N. Y. ent. soc., xiii, 28, 1905.

*Culex cantator* Smith, N. J. Agr. Exp. Sta., Rept. Mosq., 238, 1905.

The species breeds near the sea shore along the northern Atlantic coast, not necessarily in salt water. It breeds all Summer, apparently.

*Aedes pullatus* Coquillett.

*Culex impiger* Dyar, Proc. ent. soc. Wash., vi, 37, 1904.

*Culex impiger* Dyar & Knab (in part), Proc. ent. soc. Wash., vi, 144, 1904.

*Culex pullatus* Coquillett, Proc. ent. soc. Wash., vi, 168, 1904.

*Culex pullatus* Dyar, Journ. N. Y. ent. soc., xii, 245, 1904.

One of the early spring species, very abundant in snow water in the Selkirks of eastern British Colombia. It possibly has a northern distribution, but no data are available, as all the black-legged species have been lumped under *nigripes* Zett. in the literature.

*Aedes grossbecki*, new species.

*Culex squamiger* Smith (not Coquillett), Ent. News, xv, 80, 1904.

*Culex squamiger* Smith & Grossbeck, Psyche, xii, 13, 1905.

*Culex squamiger* Smith, N. J. Agr. Exp. Sta., Rept. Mosq., 224, 1905.

*Culex curriei* Dyar (in part), Journ. N. Y. ent. soc., xiii, 28, 1905.

*Culex squamifer* Blanchard (in part), Les Moustiques, 630, 1905.

The New Jersey specimens identified as "*Culex squamiger* Coq." by Mr. Coquillett and published by Prof. Smith we fully believe to be a distinct species. Mr. Quayle records (Can. ent., xxxviii, 27, 1906) the true *squamiger* (Coquillett, Proc. U. S. Nat. Mus., xxv, 85, 1902) as a salt marsh species from the Californian coast, to which it is no doubt confined. The New York records of "*Grabhamia curriei* Coq." seem to refer to the present species. Unfortunately we have not been able to secure Californian larvæ for comparison, although Mr. Quayle kindly endeavored to supply us. It is quite possible that the *Culex onondagensis* Felt (Bull. 79, N. Y. Sta. Mus., 304, 1904) may prove to be this species, in which case our new name may be placed in the synonymy.

*Aedes pretans* Grossbeck.

*Culex pretans* Grossbeck, Ent. News., xv, 332, 1904.

*Culex pretans* Smith & Grossbeck, Psyche, xii, 17, 1905.

*Culex pretans* Smith, N. J. Agr. exp. Sta., Rept. Mosq., 293, 1905.

*Culex pretans* Britton & Viereck, Rept. Conn. Agr. Ex. Sta. 1904, pt. iii, pl., xii, 1905.

One of the early Spring forms. Its distribution seems to be less northern than some of the others.

*Aedes æstivalis* Dyar.

*Culex æstivalis* Dyar, Journ. N. Y. ent. soc., xii, 245, 1904.

Common in the Selkirks of eastern British Colombia, the adults flying later than the earliest Spring species, of which this is probably one.



***Aedes subcantans* Felt.**

- Culex cantans* Smith (not Meigen), Ent. News, xiii, 300, 1902.  
*Culex cantans* Johannsen (not Meigen), Bull. 68, N. Y. Sta. Mus., 420, 1903.  
*Culex cantans* Smith (not Meigen), Bull. 171, N. J. Agr. Exp. Sta., 24, 1904.  
*Culex cantans* Dyar (not Meigen), Journ. N. Y. ent. soc., xii, 174, 1904.  
*Culex cantans* Felt (not Meigen), Bull. 79, N. Y. Sta. Mus., 286, 1904.  
*Culex cantans* Smith (not Meigen), N. J. Agr. Exp. Sta., Rept. Mosq., 242, 1905.  
*Culicada subcantans* Felt, Bull. 97, N. Y. Sta. Mus., 474, 1905.

One of the early Spring forms, occurring in the northeastern United States. This is probably the *Culex stimulans* Walker (Cat. Brit. Mus., Dipt., i, 4, 1848); the types should be compared.

***Aedes laternaria* Coquillett. Fig. 17.**

*Verrallina laternaria* Coquillett, Proc. ent. soc. Wash., vii, 184, 1906.

Collected by Mr. Busck in a hollow tree in Trinidad.

***Aedes lazarensis* Felt & Young.**

- Culex lazarensis* Felt and Young, Science, n. s., xx, 505, 1904.  
*Culex lazarensis* Felt, Bull. 79, N. Y. Sta. Mus., 310, 1904.  
*Culicada lazarensis* Felt, Bull. 79, N. Y. Sta. Mus., 478, 1905.

One of the early Spring forms not uncommon in northern New York. The senior author has collected it in Plattsburgh.

***Aedes quaylei*, new species.**

- Culex curriei* Coquillett (in part), Can. ent. xxxiii, 259, 1901.  
*Grabhamia curriei* Theobald (in part), Mon. Culic., iii, 249, 1903.  
*Culex curriei* Blanchard (in part), Les Moustiques, 285, 1905.  
*Grabhamia curriei* Dyar (in part), Journ. N. Y. ent. soc, xiii, 28, 1905.  
*Culex curriei* Quayle, Ent. News, xvii, 4, 1906.

This species is the salt marsh form of the Pacific Coast, as shown by Quayle. The types of *curriei* were from diverse localities, but the North Dakota specimen must be regarded as the actual type in restricting it. This form has never been bred; it cannot be the same species as the Californian salt marsh species. It may be conspecific with the specimens from New York mentioned above under *A. grossbecki*, but this has yet to be proved.

***Aedes cyaneus* Fabricius. Fig. 18.**

- Culex cyaneus* Fabricius, Syst. Antliat., 35, 1905.  
*Hæmagogus cyaneus* Blanchard, Les Moustiques, 112, 1805.

Mr. Busck brought some living larvæ from San Domingo collected in bamboo joints. The junior author found it at Sonsonate, Salvador,



and Port Limon, Costa Rica, in water in cocoanut shells and cacao husks.

*Aedes knabi* Coquillett. Fig. 19.

*Culex knabi* Coquillett, Proc. ent. soc. Wash., vii, 183, 1906.

Collected by the junior author at Tehuantepec, Mexico, in a hollow in a mango tree and at Salina Cruz, Mexico, also in a tree hole.

*Aedes insolita* Coquillett. Fig. 20.

*Verrallina insolita* Coquillett, Can. ent. xxxviii, 62, 1906.

Collected by the junior author at Tehuantepec, Salina Cruz, Almoloya, Mexico; Sonsonate, Salvador, and Puntarenas, Costa Rica. The larvæ were all in holes in trees except in one instance, at Tehuantepec, they were in a (cemented) tank in a shaded part of the garden at the public bath house.

Genus *CULISETA* Felt.

*Theobaldia* Neveu-Lemaire (not *Theobaldius* Nevill), C. R. heb. soc. Biol., liv, 1329, 1902.

*Culiseta* Felt, Bull. 79, N. Y. Sta. Mus., 391 c, 1904.

*Theobaldinella* Blanchard, Les Moustiques, 390, 1905.

The larvæ of this genus are extremely similar; the following small differences appear to hold for the species. The European *annulatus* Schrank is recorded from the West coast of America, but we have seen no larvæ. Meinert's excellent figure as well as Theobald's (Mon. Culic., iii, 150, 1903) show it to be a *Culiseta*, but neither is detailed enough to let us place the larva in the table. *Grabhamia vittata* Theobald (Can. ent. xxxv, 313, 1903) probably belongs here likewise. (See remarks under *Aedes abfitchii*).

Table of species.

- |   |                    |
|---|--------------------|
| 1. Lower head tuft with three long hairs, upper multiple..... | 2                  |
| Both head tufts multiple, alike.....                          | <i>absobrinus</i>  |
| 2. Basal pecten teeth of the air tube furcate.....            | <i>incidens</i>    |
| Basal pecten teeth of the air tube with many branches.....    | <i>consobrinus</i> |

*Culiseta incidens* Thomson.

*Culex incidens* Thomson, Kongl. Sven. Freg. Eugenies Resa omk. jood., Dipt., 443, 1868.

*Culex incidens* Dyar, Proc. ent. soc. Wash., vi, 38, 1904.

*Culex nigripes* Blanchard (not Zetterstedt), Les Moustiques, 345, 1905.

*Theobaldinella incidens* Blanchard, Les Moustiques, 393, 1905.

The species is common in the western United States to the Pacific coast, the larvæ occurring in water barrels and tanks as *Culex pipiens* does in the East, although not so exclusively a domestic mosquito. The eggs are laid in boats. Our easternmost record is Banff, Alberta, where the senior author collected it in sulphurous pools.

***Culiseta absobrinus* Felt.**

*Culex absobrinus* Felt, Bull. 79, N. Y. Sta. Mus., 318, 1904.

*Culex absobrinus* Dyar, Journ. N. Y. ent. soc., xiii, 24, 1905.

*Theobaldia absobrinus* Dyar, Journ. N. Y. ent., soc., xiii, 107, 1905.

The species has a northern distribution, being recorded from Elizabethtown and Tupper Lake, New York, and Kaslo, British Columbia. The larvæ occur in permanent pools in the same manner as *C. incidens*. We have not found them in artificial receptacles.

***Culiseta consobrinus* Desvoidy.**

*Culex consobrinus* Desvoidy, Mem. soc. d'his. nat., Paris, iii, 408, 1827.

*Culex consobrinus* Dyar, Journ. N. Y. ent. soc., xi, 24, 1903.

*Culex consobrinus* Dupree & Morgan, Science, n. s., xvi, 1036, 1902.

*Culex magnipennis* Felt, Bull. 79, N. Y. Sta. Mus., 324, 1904.

*Culex consobrinus* Dyar, Journ. N. Y. ent. soc., xiii, 26, 1905.

*Culex consobrinus* Blanchard, Les Moustiques, 352, 1905.

The species occurs throughout the eastern United States. We have it from Baton Rouge, La. (Dupree), Urbana, Ill. (Knab), Jacksonville, Fla. (Dyar), Albany, N. Y. (Felt). Professor Blanchard gives western localities, which we have not seen verified by any specimens from beyond the Rocky Mountains. The larvæ live in permanent water, often in pools left in the beds of streams in well shaded places.

**Genus *CULICELLA* Felt.**

*Culicella* Felt, Bull. 79, N. Y. Sta. Mus., 391c, 1904.

***Culicella dyari* Coquillett.**

*Culex dyari* Coquillett, Journ. N. Y. ent. soc., x, 192, 1902.

*Culex dyari* Blanchard, Les Moustiques, 364, 1905.

The larva is one of the early Spring forms, although rather late in the cold northern bogs. It is the only larva of the long-tubed series that has such a habit. We took the species not uncommonly early in Spring near Springfield, Mass., and the senior author has collected it in New Hampshire, northern New York and eastern British Co-

lumbia. It undoubtedly has a northern range, like all the early Spring forms that hibernate in the egg state.

#### Genus CULEX Linnæus.

*Culex* Linnæus, Syst. nat., ed. x, 602, 1758.

*Melanoconion* Theobald, Mon. Culic., iii, 238, 1903.

*Melanoconium* Blanchard, Les Moustiques, 395, 1905.

*Necoculex* Dyar, Proc. ent. soc. Wash., vii, 48, 1905.

*Micraëdes* Coquillett, Proc. ent. soc. Wash., vii, 185, 1906

*Tinolestes* Coquillett, Proc. ent. soc. Wash., vii, 185, 1906.

The larvæ typically have the antennæ with a large tuft at about the outer third, beyond the middle, the part before the tuft thick, that beyond it slender; air tube long, over four times as long as wide with several tufts along the posterior edge; anal segment uniformly ringed by a chitinous band, the ventral brush confined to the barred area. Certain species diverge from this type in the degeneration of the antennæ, which come to resemble those of *Aëdes*. Others diverge in the shortening of the air tube. In two species both these divergences coexist and, although they still retain the multiple tufts of the air tube, we have been obliged to include their names in both the tables of the species of *Aëdes* and *Culex* to avoid confusion. It happens that some *Aëdes* have the anal segment ringed, and one (*trichurus* Dyar) has multiple tufts on the tube, which renders the absolute definition of these genera difficult when the aberrant forms are included.

#### Table of species.

1. Antennæ with the tuft at the middle of the uniformly shaped joint.....2  
Antennæ with the tuft outwardly placed, the part beyond slender.....5
2. Air tube very long (8 x 1), pecten teeth long spines; abdominal hairs in coarse stellate tufts.....*bisulcatus*  
Air tube shorter, about four times as long as wide.....3  
Air tube only about two-and-a-half times as long as wide.....4
3. Antennæ with a tuft; anal segment smooth.....*restuans*  
Antennæ with a single hair; anal segment spined.....*pleuristriatus*
4. Ring of anal segment narrow; pecten not to half of the tube; two tufts within pecten, two beyond in line.....*janitor*  
Ring of anal segment broad; pecten over half of tube; two tufts within, two beyond not in line, two on dorsal aspect.....*lactator*
5. Air tube three times as long as wide or less.....6  
Air tube four times as long as wide or over.....7
6. Body pilose; pecten of the air tube to three-fourths.....*interrogator*  
Body spicular-granular; pecten of the air tube small, to one-third *barbarus*

7. Anal appendages only two.....*bahamensis*  
    Anal appendages four, normal.....8
8. Air tube with three paired tufts posteriorly outwardly, the middle one  
    moved laterad out of line, usually situated near or not much beyond  
    the middle of the tube.....9  
    Air tube with four paired tufts posteriorly outwardly (sometimes increased  
    by additional ones basally), the subapical one moved laterad out of  
    line, usually situated at the outer third of the tube.....14  
    Air tube with four to ten paired tufts along the posterior line in a straight  
    row, none displaced, or the hairs obsolete or absent.....18
9. Body glabrous; air tube 7 x 1; antennæ dark.....*mortificator*  
    Body spicular or pilose.....10
10. Dislocated tuft of tube well beyond the middle.....*carmodyæ*  
    Dislocated tuft of tube not, or scarcely beyond the middle.....11
11. Anal processes broad and bluntly rounded.....12  
    Anal processes long and tapered, rather sharply pointed.....13
12. Air tube subfusiform, tapered on outer half; body spicular.....*extricator*  
    Air tube gently tapered uniformly; body pilose.....*declarator*
13. Air tube very slightly flared at tip; pecten very long, as long as the  
    diameter of the tube at the middle.....*proclamator*  
    Air tube regularly tapered on outer two-thirds to tip; pecten long but not  
    equalling half the diameter of the tube.....*inquisitor*
14. Air tube long, over 5 x 1, the sides nearly straight without marked taper-  
    ing.....15  
    Air tube less than five times as long as wide, the sides curved, tapering  
    rather rapidly after the middle, subfusiform.....17
15. Body glabrous.....*salinarius*  
    Body spicular-pilose.....16
16. Air tube 8 x 1, the tufts 3-haired and short; antennæ dark.....*habilitator*  
    Air tube 6 x 1, the tufts 2-haired and long; antennæ pale at base.....*factor*  
    Air tube 7 x 1, the tufts single and very long; antennæ pale.....*regulator*
17. Air tube 5 x 1, pecten teeth about 15; subdorsal hairs of abdominal seg-  
    ments 3 and 4 double.....*pipiens*  
    Air tube 4 x 1, pecten teeth about nine; subdorsal hairs of abdominal  
    segments 3 and 4 single.....*cubensis*
18. Air tube with a subapical crown of spikes; body pilose.....*coronator*  
    Air tube without a crown of spikes, smooth throughout.....19
19. Air tube with long well-defined tufts.....20  
    Air tube with small double or single hairs, or bare.....31
20. Body spicular-pilose.....21  
    Body glabrous or lightly granular.....26
21. Five tufts on posterior margin of tube subequal in length, short; lateral  
    abdominal hairs in twos on segments 3 to 5.....22  
    Five tufts on tube with the basal one very long, the rest progressively  
    shorter; abdominal hairs in threes on segments 3 to 5.....23

22. Air tube 11 x 1; upper head hair double; pecten of air tube moderate  
*derivator*  
Air tube 6 x 1; upper head hair single; pecten long ..... *investigator*  
Air tube 6 x 1; upper head hair multiple; pecten rather long. .... *inhibitor*
23. Upper head hair triple; tufts of tube long, the basal one over half the  
length of the tube ..... *mutator*  
Upper head hair single; tufts of tube all shorter than half its length. .... 24
24. Pecten of tube dense and fine, not as long as diameter of tube. .... 25  
Pecten sparse and open, equalling the diameter of the tube at middle  
*elevator*
25. Dorsal hairs stellate, long; antennæ dark. .... *educator*  
Dorsal hairs small; antennæ pale at base. .... *conspirator*
26. Air tube concave, the tip expanded. .... 27  
Air tube regularly tapered, the tip not widened. .... 28
27. Pecten of air tube short; antennæ pale at base; lateral comb of the eighth  
segment a large patch of spines. .... *territans*  
Pecten of the air tube of long spines; antennæ dark; lateral comb of  
the eighth segment scarcely over two rows deep. .... *simulator*
28. Both head hairs single. .... *gravitator*  
Upper head hair triple, lower single. .... *decorator*  
Both head hairs triple or multiple. .... 29
29. Lateral abdominal hairs in threes after the second segment; body glabrous;  
air tube not over five times as long as wide. .... *tarsalis*  
Lateral abdominal hairs in twos after the second segment; body spicular-  
granular; air tube 6 x 1. .... 30
30. Air tube with ten close tufts; antennæ pale at base; dorsal tufts of anal  
segment 1 + 3 on each side. .... *secutor*  
Air tube with six to seven sparse tufts; antennæ dark; dorsal tufts of anal  
segment 1 long + 1 long and one short. .... *lamentator*
31. Air tube very long with a swelling at outer fourth. .... *daumasturus*  
Air tube uniform, without any swelling. .... 32
32. Air tube with slight tufts. .... 33  
Air tube with single hairs or bare. .... 37
33. Pecten of the air tube reaching to one-third (Dr. Grabham). .... 34  
Pecten of the air tube reaching one-fourth or less. .... 35
34. Pecten short and broad, the tube 8 x 1, slightly curved forward; labial plate  
with subbasal tooth projecting. .... *microsquamosus*  
Pecten long, the tube 10 x 1; labial plate with even teeth. .... *atratus*
35. Pecten dense and fine; lateral hairs in threes after the second segment  
*carcinophilus*  
Pecten sparse and long. .... 36
36. Lateral hairs in twos after the second segment; comb of the eighth seg-  
ment of very long spines. .... *receptor*  
Lateral hairs in fours after the second segment; comb of shorter spines  
and more rows deep. .... *vector*



37. Pecten of the air tube of five teeth, the last two long and remote, on the basal one-seventh of the tube ..... *inimitabilis*  
 Pecten of numerous teeth densely and regularly spaced ..... 38
38. Lateral abdominal hairs single on segments 3 to 5 ..... *conservator*  
 Lateral abdominal hairs double on segments 3 to 5 ..... 39
39. Air tube with four rather long single hairs on posterior margin ..... *restrictor*  
 Air tube with a single small hair or none ..... 40
40. Pecten of the air tube reaching to one-fourth ..... *divisor*  
 Pecten of the air tube reaching to one-third ..... *latisquamma*

***Culex bisulcatus* Coquillett. Fig. 21.**

*Micraëdes bisulcatus* Coquillett, Proc. ent. soc. Wash., vii, 185, 1906.

The antennæ have the tuft at the middle; the head tufts multiple; air tube very long with long pecten reaching nearly half way, followed by scattered tufts. Anal segment with the chitinous ring furnished with long spines on the posterior edge.

The specimens were collected by Mr. Busck in Guadeloupe on the Soufrière, 3,000 feet altitude, and in San Domingo, from larvæ in Bromelias and leaf angles of Spanish Bayonet.

***Culex restuans* Theobald.**

- Culex restuans* Theobald, Mon. Culic., ii, 142, 1901.  
*Culex restuans* Dyar, Journ. N. Y. ent. soc., x, 199, 1902.  
*Culex restuans* Smith, Ent. News, xiii, 302, 1902.  
*Culex restuans* Dyar, Ent. News, xiv, 41, 1903.  
*Culex restuans* Dyar, Proc. ent. soc. Wash., v, 144, 1903.  
*Culex restuans* Johannsen, Bull. 68, N. Y. Sta. Mus., 417, 1903.  
*Culex restuans* Smith, Bull. 171, N. J. Agr. Exp. Sta., 16, 1904.  
*Culex restuans* Dyar & Knab, Proc. ent. soc. Wash., vi, 143, 1904.  
*Culex restuans* Felt, Bull. 79, N. Y. Sta. Mus., 326, 1904.  
*Culex restuans* Smith, N. J. Agr. Ex. Sta., Rept. Mosq., 315, 1905.

The larva is apparently a normal inhabitant of hollow trees and dirty permanent pools. It is a wild species, native to the northeastern part of the continent, but takes very kindly to rain water barrels and other artificial breeding places. In places well removed from the seaboard and from large towns, where *Culex pipiens* has not yet penetrated, it is the dominant species in water barrels. Nearer the coast, it appears mixed with *pipiens*. The eggs are laid in rafts and the early stages are closely similar to *pipiens*, although the larva is readily enough distinguished by the structure of the antennæ.



*Culex pleuristriatus* Theobald. Fig. 22.*Culex pleuristriatus* Theobald, Mon. Culic., iii, 177, 1903.*Culex pleuristriatus* Bourroul, Mosq. do Brasil, 43, 1904.

Described from Brazil. Mr. Coquillett has given us the name for a specimen from Trinidad from Mr. F. W. Urich, bred from Bromelia water. Its peculiar characters are indicated in the table. The mosquito fauna of the Bromelias is very rich, both in Sabethines and members of the genus *Culex*, as well as the *Megarhinus* that prey on them.

*Culex janitor* Theobald.*Culex janitor* Theobald, Mon. Culic., iii, 182, 1903.*Culex janitor* Grabham, Can. ent., xxxvii, 406, 1905.

Described from Jamaica. Dr. Grabham figures the larva which we have not seen in nature. Mr. Coquillett applied the name tentatively to a very different species, to which we shall refer further on.

*Culex lactator*, new species. Fig. 23.

With the characters given in the table; a very distinct form. The larva contradicts both the characters which usually define the species of *Culex*, but we nevertheless believe that it belongs here. The anal segment has the normal structure of all the *Culex* species.

The larvæ were taken by the junior author in puddles at Cordoba, Santa Lucrecia, Rincon Antonio, Tehuantepec and Almoloya, Mexico; Puntarenas and San José, Costa Rica. The adults were named "*Culex? secutor* Theob." and mixed with another species (*C. coronator* D. & K.) under this name. Compare our remarks under *Culex secutor* and *Janthinosoma scholasticus*.

*Culex interrogator*, new species. Fig. 24.

The antennæ have the normal structure for *Culex*, but the air tube is short as in *Aedes*. Its pecten is stout and runs to the apical fourth. There are three hair tufts and a fourth smaller, placed laterally. The comb of the eighth segment is in a long straight row, supplemented by a second shorter one. The anal segment is normal. The skin is pilose; the tracheæ broad.

Collected by the junior author at Rincon Antonio, Mexico, in ditches. The adults were named "*Culex? salinarius* Coq." by Mr. Coquillett, with which species they have nothing whatever to do.

*Culex barbarus*, new species. Fig. 25.

Very nearly allied to *C. cubensis* Bigot, but the air tube much stouter. The lateral hairs are in twos after the second abdominal segment, the subdorsal ones also in twos. Tracheæ broad.

A single specimen was collected by Mr. Busck in a lagoon pool far from habitation on the South coast of Trinidad. It was named "*Culex pipiens* L." by Mr. Coquillett.

*Culex bahamensis*, new species. Fig. 26.

This very peculiar species was collected by Dr. T. H. Coffin in the Bahamas, but, although he preserved pupæ, he obtained no adults. The skin is glabrous, but curiously enough, the air tube is pilose outwardly. The lateral hairs are in threes on the third and fourth segments, in twos on the fifth and sixth. There are but a single pair of anal gills, a character only paralleled in *Wyeomia*. The six tufts of the air tube are arranged in a line along the posterior margin, three of them within the pecten.

*Culex mortificator*, new species. Fig. 27.

Antennæ normal, dark throughout; head hairs in threes. Air tube seven times as long as wide, uniformly slightly tapering, the pecten on the basal fourth; tufts very long but few-haired. Comb of the eighth segment of many long spine-like scales in a large patch. Anal segment rather long, normal; anal gills unusually long.

Collected by the junior author in Zent, Costa Rica, in a hollow in a stump of a banana tree, but no adults were obtained.

*Culex carmodyæ*, new species. Fig. 28.

Antennæ normal, pale at base. Body pilose; lateral hairs in twos after the second segment; subdorsal hairs long and in twos on segments 5, 6 and 7; tracheæ broad. Air tube five to seven times as long as wide with the three tufts in twos, the basal very long, the others successively shorter. Comb of the eighth segment normal, moderate.

Collected by Mr. Busck in San Domingo from a vase in the hotel parlor and in a slowly running water course across a road. The adults were named "*Culex salinarius* Coq." and "*Culex pipiens* L.," neither of which species occurs in the island to our knowledge. We

name the species for Miss Mary Carmody, who has done excellent and faithful work in drawing the mouth parts of larvæ, and is withal a most amiable young lady.

*Culex extricator*, new species. Fig. 29.

The antennal tuft arises near the middle, but has a distinct notch; the head hairs are in threes or fours; air tube much tapered on outer half, the tufts weak; body shortly hairy, the spicules not much elongated. The lateral hairs are in twos after the second abdominal segment. Lateral comb of the eighth segment well developed. Anal gills bluntly rounded.

Collected by Mr. Busck in a bucket used to keep live crabs at Cedros, Trinidad. The adults were named "*Culex pipiens* L." by Mr. Coquillett.

*Culex declarator*, new species. Fig. 30.

Antennal tuft placed well outward, the member all dark. Head hairs in fours; body pilose; lateral hairs in twos after the second abdominal segment. Air tube five times as long as wide, the pecten reaching one-third. Lateral comb of the eighth segment large; anal gills short and blunt.

Collected by Mr. Busck in a lagoon pool far from habitation on the south coast of Trinidad. The adults were named "*Culex pipiens* L." by Mr. Coquillett.

*Culex proclamator*, new species. Fig. 31.

Antennal tuft at the outer third, the member dark; head hairs in threes; body pilose; tracheæ broad. The subdorsal hairs of the abdominal segments are very long. Air tube five times as long as wide, strongly tapered outwardly, the apical third nearly straight; pecten very long and running to one-half.

Collected by the junior author at Santa Lucrecia and Almoloya, Mexico; Puntarenas, Costa Rica.

The adults were named "*Culex? salinarius* Coq." and "*Culex? securator* Theob."

*Culex inquisitor*, new species. Fig. 32.

Antennal tuft well outward, the whole member dark; head hairs in threes; lateral abdominal hairs in twos after the first segment.

Air tube five times as long as wide, the pecten short and reaching nearly to the middle. Anal gills long and pointed.

Collected by Mr. Busck in a manure ditch behind a stable, Cedros, Trinidad, and in pods of cocoa in "stinking black half solid water" in Dominica. The eggs are laid in boats. Also obtained by the junior author in Santa Lucrecia, Mexico and Puntarenas, Costa Rica. All the adults were labelled "*Culex secutor* Theob." by Mr. Coquillett.

***Culex salinarius* Coquillett.**

*Culex nigrutilus* Smith, Ent. news, xiii, 303, 1902.

*Culex nigrutilus* Dyar, Journ. N. Y. ent. soc., xi, 24, 1903.

*Culex nigrutilus* Dyar, Proc. ent. soc. Wash., v, 143, note, 1903.

*Culex nigrutilus* Smith, Rept. ent. Dept. N. J. Agr. Exp. Sta., 535, 1903.

*Culex salinarius* Coquillett, Ent. News, xv, 73, 1904.

*Culex salinarius* Smith, Bull. 171, N. J. Agr. Exp. Sta., 23, 1904.

*Culex salinarius* Dyar, Journ. N. Y. ent. soc., xii, 173, note, 1904.

*Culex salinarius* Felt, Bull. 79, N. Y. Sta. Mus., 332, 1904.

*Culex salinarius* Smith, N. J., Agr. Exp. Sta., Rept. Mosq., 318, 1905.

This species is unfortunately misnamed, for it never lives in salt water. It is a permanent swamp species, often frequenting rain barrels and occurring from the Atlantic to the Mississippi Valley. Our records are Chesapeake Beach, Md. (Dyar), Newark, N. J. (Brehme), Urbana, Ill. (Knab), Washington, D. C., (Dyar), Georgetown, D. C. (Caudell), Springfield, Mass. (Knab), St. Louis, Mo. (Busck).

***Culex habilitator*, new species. Fig. 33.**

Antennæ with the tuft at outer third, all dark. Head hairs, the upper tuft in four or five, the lower in three. Body pilose; lateral hairs in twos after the second abdominal segment; subdorsal hairs in threes on segments 3 to 7. Air tube very long, 8 x 1, the pecten reaching nearly one-third.

The larvæ were collected by Mr. Busck in a small pool in a cave in coral cliffs near the ocean in San Domingo and in a large crab hole in a lagoon along a river, but these last are referred here with doubt as the condition of the skins is imperfect. The specimens were named "*Culex secutor* Theob."

***Culex factor*, new species. Fig. 34.**

Antennal tuft beyond the middle, the member pale on the basal half. Head hairs in threes; body pilose; tracheal tubes broader than

in *coronator*. Lateral hairs in twos after the second abdominal segment. Subdorsal hairs very long and in twos on segments 4 to 7. Air tube long,  $6 \times 1$ , the pecten reaching to one-third.

Collected by the junior author at Santa Lucrecia, Rincon Antonio, Tehuantepec and Salina Cruz, Mexico, and labelled "*Culex? secutor* Theob." by Mr. Coquillett. Others were taken at St. Vincent, Barbadoes and Martinique by Mr. Busck and labelled "*Culex salinarius* Coq." by the author of that species; but these specimens of Mr. Busck we refer here more doubtfully, as their condition is so poor that we cannot be certain of them. Mr. Busck's material was all taken out and handled by Mr. Coquillett before our final examination, which extra handling was far from beneficial to the skins.

*Culex regulator*, new species. Fig. 35.

Antennæ with the tuft nearly at the outer third, pale at base. Head hairs in threes; body pilose; lateral hairs in twos after the second abdominal segment; tracheæ broad. Air tube  $7 \times 1$ , with long single hairs, the pecten reaching to one-fourth. Anal gills long and pointed.

Collected by Mr. Busck in an old bucket in a field in San Domingo. The adults were named "*Culex salinarius* Coq."

*Culex pipiens* Linnaeus. Fig. 36.

*Culex pipiens* Linnaeus, Syst. Nat., ed. x, 601, 1758.

*Culex pipiens* Blanchard, Les Moustiques, 340, 1905.

Antennal tuft at the outer third, the member all dark. Head hairs in fours or more; body glabrous; lateral hairs in twos after the second abdominal segment; subdorsal hairs in twos; tracheæ broad. Air tube about five and a half times as long as wide, the pecten reaching nearly one-third.

We have accepted this form as the common European species introduced into America, although in spite of various efforts we have been unable to secure any European larvæ for comparison. The species is domestic in habits, the larvæ occurring in rain water barrels and other artificial receptacles. The distribution is Northern, but not boreal and is confined to the vicinity of civilization. Our records are: Bellport, N. Y. (Dyar), Ithaca, N. Y. (Johannsen), West Springfield, Mass. (Knab), Durham, N. H. (Dyar), Chicago, Ill. (Kelly),



Urbana, Ill. (Knab), Murphysboro, Ill. (Mosier), Arlington and Rosslyn, Va. (Pergande).

*Culex cubensis* Bigot. Fig. 37.

*Culex pungens* Wiedemann (not Desvoidy), Auss. zweifl. Ins., i, 11, 1828.

*Culex cubensis* Bigot, Hist. fise. Isl. Cuba, vii, 329, 1857.

*Culex fatigans* Blanchard (in part), Les Moustiques, 353, 1905.

This is the *Culex pungens* Wied. and is the form called "*Culex fatigans* Wied." by Mr. Theobald and, following him, by Miss Ludlow. We are unable to consider it conspecific with the Indian *fatigans*. In the first volume of his monograph of Culicidæ (pp. 28 and 43), Mr. Theobald quotes a figure of the larva and account of its habits from Capt. James, which evidently refers to a wild long-tubed species, something like our *territans*. Other authors refer to *fatigans* as a domestic species, so it may be that Mr. Theobald did not rightly name Capt. James' material. We have specimens from India labelled *fatigans* which come very near our *cubensis*, yet show enough difference to prevent our putting them under the same name. *Cubensis* appears to be the earliest valid name based on American specimens, of those that have been referred to the synonymy of *fatigans*, and we therefore use the name.

The larva is close to *pipiens*, but has a shorter air tube, 4 x 1, and the subdorsal hairs are single. It is a domestic species, but has a southern distribution, overlapping *pipiens* in the northern part of its range only. The junior author collected it in a shallow puddle at Cordoba, in a water barrel at the door of a workman's dwelling and in a trench back of a store in Rincon Antonio; in a hole in a tree trunk at Tehuantepec, Mexico; in a barrel of clear water in a shed at San José; in a boat full of rain water, Port Limon, Costa Rica. Mr. Busck collected it in an earthen-ware vessel of rain water, in an open ditch along a road, in a bucket used to keep live crabs, in an unused chicken feeder in Cedros; in a hollow tree near a house, Montserrat, Trinidad; in an old starch barrel, St. Vincent; in a barrel back of a house, Barbadoes; in a hollow tree, Port de France; in running water in a horse trough, in running water in the country with green algæ, in a rain water barrel in a negro's house, Martinique; in an old sugar boiler, Dominica; in a water hole in the country, St. Thomas; in an old iron tank, City of San Domingo. We have North American specimens



from Victoria, Texas (Hinds), Baton Rouge, La. (Dupree), and Washington, D. C. (Dyar). The specimens were uniformly determined as "*Culex pipiens* L." by Mr. Coquillett.

Concerning the supposed transference of *Filaria* by this species, we presume it is not necessary for it to be strictly conspecific with the Indian *fatigans* in order to accomplish it, for a number of not closely allied mosquitoes appear to be regarded as carrying agents (compare Blanchard, Les Moustiques, 536, 1905). We would observe that the *Culex skusei* which Col. Giles regarded as the transferring agent of *Filaria* is a good species, not a synonym of *fatigans* as stated by Blanchard, nor even a variety of it as Theobald makes it, to judge from the published figure of the larva. We do not know *skusei* in America.

*Culex coronator*, new species. Fig. 38.

Antennæ with the tuft slightly beyond the middle, pale; head hairs, the upper in four or five, the lower in three or four, rarely five; body hairy. Air tube long,  $9 \times 1$ , the pecten reaching two-fifths, a crown of coarse spikes before apex, usually well developed, sometimes nearly obsolete. Anal gills moderate.

An abundant species throughout the tropics, apparently absent from the islands. Mr. Busck took it in a pool in the woods at St. Joseph, Trinidad, in a lagoon pool on the South side of Trinidad, in a bucket with live crabs and an open ditch in the middle of the village, Cedros, Trinidad. The junior author found this the commonest species in Mexico and Central America. The localities are: puddles in street, shallow puddle on outskirt, pools in a stream, Cordoba; muddy road way along railroad tracks, Tehuantepec; puddles, etc., Salina Cruz; tanks at Acapulco, Mexico; puddles, San Jose de Guatemala; ditch, San Salvador; hole in root of tree, Sonsonate, Salvador; shallow pool, Puntarenas, large muddy puddle and barrel of clear water, San Jose, Costa Rica; puddles in freshly dug railroad ditch, Port Limon, Costa Rica. This is a most inoffensive mosquito. Although breeding in myriads in all roadside puddles it seems not to bite and does not enter houses. The adults were all named "*Culex secutor* Theob." by Mr. Coquillett, except one of Mr. Busck's, which was called "*pipiens*" (it may have been in bad condition). To the junior author's specimens he added a query and the note "also *janitor*? and *tarsalis*?"

*Culex derivator*, new species. Fig. 39.

Antennæ with the tuft well outward; upper head tuft double, very long, body hairy; tracheæ narrow; lateral hairs in twos after the second abdominal segment. Air tube very long,  $11 \times 1$ , pecten reaching one-third its length, the distal teeth detached; five short tufts on posterior margin. Lateral comb of the eighth segment large, of long spines.

Taken by the junior author in a puddle in a ravine at Cordoba, Mexico, but not bred.

*Culex investigator*, new species. Fig. 40.

Antennæ with the tuft slightly beyond the middle, dark; head hairs single; body pilose; lateral hairs in twos after the first abdominal segment. Air tube five-and-a-half times as long as wide, rather markedly tapered on basal third; pecten of long teeth, reaching two-fifths, followed by five rather short hair tufts.

Taken by the junior author in a pool beside the railroad track, three miles from town, Santa Lucrecia, Mexico. Mr. Coquillett seems not to have named the adult although one was bred.

*Culex inhibitor*, new species. Fig. 41.

Antennæ with the tuft near the outer third, dark; upper head tuft of four, short, lower long and single; body hairy; lateral hairs in twos after the first abdominal segment; tracheæ narrow. Air tube long,  $6 \times 1$ , the pecten long and reaching one-third, with five tufts, decreasing in length a little toward tip. Anal segment long, but the gills short.

Collected by Mr. Busck in a slowly running clear cold spring in the San Francisco Mts. of San Domingo. It was named "*Melanoconion indecorabilis* Theob." by Mr. Coquillett, but that was described from Para, Brazil, and we do not believe it is our species.

*Culex mutator*, new species. Fig. 42.

Antennæ with the tuft near the outer third, pale at base; upper head tuft of three, lower single; body pilose. Air tube  $5 \times 1$ , tapered, five or six tufts along the posterior margin, the basal one longest; pecten long, but not immoderately so.

Collected by the junior author at Cordoba, Mexico, in puddles in a

ravine. The adults were named "*Melanoconion humilis* Theob." by Mr. Coquillett, but we see no reason to accept this determination. *M. humilis* was described from São Paulo, Brazil.

*Culex elevator*, new species. Fig. 43.

Antennæ with the tuft beyond the middle, pale at base; head hairs single; body hairy; two lateral hairs on the second abdominal segment, three on the third to sixth. Air tube  $6 \times 1$ , nearly straight with very long pecten; five tufts on the posterior margin; anal gills short.

Taken by the junior author in a pool of clear water containing vegetable debris at the head of a small stream two miles west of Port Limon, Costa Rica. The adults were not bred.

*Culex educator*, new species. Fig. 44.

Antennæ with the tuft at outer third, dark; head hairs single; body coarsely hairy; lateral hairs in twos on the second segment, in threes on the third to sixth; subdorsal hairs long, stellate; tracheæ narrow. Air tube  $6 \times 1$ , a little tapered, pecten moderate; five tufts on the posterior margin decreasing to tip.

Collected by the junior author in an old stream bed disconnected from the stream, containing fish, but the larvæ in reeds at the edge, Rio Aranjuez, near Puntarenas, Costa Rica. The adults were named "*Melanoconion atratus* Theob." by Mr. Coquillett.

*Culex conspirator*, new species. Fig. 45.

As in the preceding species, but differentiated by the characters given in the table.

Collected by the junior author at Almoloya, Oaxaca, Mexico, in a large pot hole full of clear water and in a shallow pool frequented by cattle at Las Loras near Puntarenas, Costa Rica. The specimens were named "*Melanoconion atratus* Theob."

#### *Culex territans* Walker.

*Culex territans* Walker, Ins. Saund., Dipt., i, 428, 1856.

*Culex territans* Dyar, Journ. N. Y. ent. soc., ix, 178, 1901.

*Culex territans* Smith, Ent. news, xiii, 302, 1902.

*Culex territans* Dyar, Proc. ent. soc. Wash., v, 48, 142, 1903.

*Culex territans* Dyar, Science, n. s., xvi, 672, 1902.

*Culex territans* Dyar, Proc. ent. soc. Wash., vi, 40, 1904.

*Culex territans* Smith, Bull. 171, N. J. Agr. exp. Sta., 24, 1904.

*Culex territans* Felt, Bull. 79, N. Y. Sta. Mus., 307, 1904.

*Culex territans* Knab, Journ. N. Y. ent. soc., xii, 246, 1904.

*Culex territans* Smith, N. J. Agr. exp. Sta., Rept. Mosq., 329, 1905.

*Culex territans* Blanchard, Les Moustiques, 367, 1905.

Our most common species in the Summer time, breeding in all the swamps especially if cold and clear. It seems entirely harmless as we have never been bitten by a specimen. The adult is in fact seldom seen, being of retiring habits. It may be obtained by sweeping the bushes.

The species occurs throughout the United States. We may mention Springfield, Mass. (Knab), Ithaca, N. Y. (Johannsen), Lahaway, N. J. (Brakely), Baltimore, Md. (Dyar and Caudell), Baton Rouge, La. (Dupree), Stanford Univ., Cal. (MacCracken), Kaslo, B. C. (Dyar and Currie).

*Culex simulator*, new species. Fig. 46.

Antennæ with the tuft at outer third, dark; upper head tuft double, lower single; body smooth; lateral hairs single on the second abdominal segment, double on the third to sixth; tracheæ narrow. Air tube 7 x 1, slightly flared at tip, with five tufts on the posterior margin; pecten very long, reaching one-third; lateral comb of the eighth segment scarcely over two rows deep. Anal segment long.

Taken by Mr. Busck in Arima, Trinidad, in the primeval woods. No adults were obtained.

*Culex gravitafor*, new species. Fig. 47.

Antennæ with the tuft before the outer third, dark; hairs single; body glabrous; lateral hairs in threes on abdominal segments 3 to 6; tracheal tubes narrow, angulated within the segments. Air tube six-and-a-half times as long as wide, with long pecten reaching to one-third. Anal gills small.

Collected by the junior author in a large Bromeliaceous plant containing water between the leaves, growing in a thicket in a valley above Cordoba, Mexico. In spite of careful attention no adults were bred. Some of the larvæ lived two months after being collected; they probably died of starvation.

*Culex decorator*, new species. Fig. 48.

Antennæ with the tuft beyond the outer third, dark; head hairs, the upper tuft triple, the lower single; lateral hairs double on the second

segment, in threes on the third to fifth, in twos and much longer on the sixth. Air tube  $7 \times 1$ , the pecten not reaching one-third, short. Anal gills short.

Collected by Mr. Busck on Tobago Island, the larvæ in bamboo joints. They were brought to Washington alive, but failed to mature.

***Culex tarsalis* Coquillett.**

*Culex tarsalis* Coquillett, Can. ent., xxviii, 43, 1896.

*Culex kelloggii* Theobald, Can. ent., xxxv, 311, 1903.

*Culex tarsalis* Dyar, Proc. ent. soc. Wash., vi, 40, 1904.

*Stegomyia* (?) *tarsalis* Blanchard, Les Moustiques, 265, 1905.

We have the species from three widely separated localities, Stanford University, Cal. (MacCracken), Victoria, B. C. (Dyar), Urbana, Ill. (Knab). The larvæ differ perceptibly; especially the Californian ones have a shorter, darker air tube and a thicker labial plate; but we do not esteem the differences to be of specific value.

***Culex secutor* Theobald. Fig. 49.**

*Culex secutor* Theobald, Mon. Culic., ii, 321, 1901.

*Culex secutor* Blanchard, Les Moustiques, 300, 1905.

*Culex secutor* Dyar, Journ. N. Y. ent. soc., xiii, 26, 1905.

Dr. Grabham has kindly sent us the larvæ from Cinchona, Jamaica. They represent a distinct species, which has not come to us from any of the other islands or the mainland.

***Culex lamentator*, new species. Fig. 50.**

Antennæ with the tuft but slightly beyond the middle, dark; head hairs in threes; body granular, subspicular; lateral hairs in twos after the first segment; tracheæ broad. Air tube  $6 \times 1$ , with six tufts along posterior line; pecten reaching a little over one-fourth. Lateral comb of the eighth segment large; gills moderate.

Collected by Mr. Busck in a hollow palm trunk in the San Francisco Mts., San Domingo. It was named "*Culex secutor* Theob." by Mr. Coquillett; it should be regarded as a distinct, but allied species, representing the Jamaican form in San Domingo.

***Culex microsquammosus* Theobald.**

*Culex microsquammosus* Theobald in Grabham, Can. ent., xxxvii, 407, 1905.

Dr. Grabham gives the larval characters in presenting Mr. Theobald's description. The species is from Jamaica.



***Culex atratus* Theobald.**

*Culex atratus* Theobald, Mon., Culic., ii, 55, 1901.

*Melanoconion atratus* Grabham in Theobald, Mon. Culic., iii, 238, 1903.

*Culex atratus* Blanchard, Les Moustiques, 335, 1905.

*Melanoconium atratum* Blanchard, Les Moustiques, 395, 1905.

*Melanoconion atratus* Grabham, Can. ent., xxxvii, 403, 1905.

The larva has been made known by Dr. Grabham. His first communication is accompanied by a plate (Mon. Culic., iii, pl. xvi) which, however, gives no adequate idea of the species, so that the senior author was led to accept one of Mr. Coquillett's determinations, and published a description of another larva under this name. (See Journ. N. Y. ent. soc., xiii, 29, 1905, and compare *Mocklostyrax erraticus* of this paper).

***Culex carcinophilus*, new species. Fig. 51.**

Antennæ with the tuft beyond the middle, dark; upper head tuft multiple, lower single; body spicular, not pilose; lateral hairs in twos on the second abdominal segment, in threes on the third to sixth. Air tube very long, 10 x 1, straight; four small, two-haired tufts on posterior margin; pecten of long spines outwardly, reaching to one-sixth. Lateral comb of the eighth segment large; anal gills very small.

Collected by Mr. Busck from crab holes containing fresh water near San Domingo City. The adults were named "*Melanoconion atratus* Theob."

***Culex daumasturus*, new species. Fig. 52.**

Distinct from any known larva by the very long air tube (12 x 1) with a swelling at the outer third.

It was collected by Mr. Busck in the leaf corner of a Century Plant near the pitch lake, La Brea, Trinidad. A second specimen has been sent us by Mr. Ulrich from Bromelias at Arima, Trinidad. The adult was named "*Culex imitator* Theob." by Mr. Coquillett, and it may be that species, which was bred from Bromelia water by Dr. Lutz in Brazil; but we do not feel certain enough of it to accept the name.

***Culex vector*, new species. Fig. 53.**

Antennæ with the tuft at the outer third, pale; body glabrous; lateral abdominal hairs in four on first segment, twos on second, fours



on third to fifth, single and long on the sixth. Air tube  $9 \times 1$ , wide at base, the pecten sparse and long, reaching to one-fourth, followed by a little double-haired tuft. Lateral comb of the eighth segment a large patch of long spines. Anal gills moderate, pointed.

Collected by Mr. Urich in Trinidad from Bromelia water. It was named by Mr. Coquillett "*Culex varipalpus* Coq.," but on our remonstrating with him, it was changed to "*Culex imitator* Theob." We cannot adopt this name, either. (See remark under the preceding species).

*Culex rejector*, new species. Fig. 54.

Antennæ with the tuft near the outer third, pale; head hairs, the upper tuft multiple, the lower single; body glabrous; lateral hairs in twos on segments 2 to 5, single on the sixth; tracheal tubes narrow, angled. Air tube very long,  $10 \times 1$ , nearly straight, with four small tufts on posterior margin; pecten of very long spines to one-fifth. Lateral comb of the eighth segment of long spine-like scales. Lateral tuft of the anal segment very large; gills long and pointed.

Collected by the junior author in a large Bromeliaceous plant at Cordoba, Mexico, with *C. gravitator*. All these larvæ died, presumably from lack of their natural food.

*Culex inimitabilis*, new species. Fig. 55.

Collected in Bromelia water by Mr. Urich in Trinidad with *C. daumasturus*, which it resembles, but lacks the swelling on the tube. The body is smooth; the lateral hairs are in threes on the first segment, twos on the second, threes and short on the third to fifth, twos and long on the sixth. It was named "*Culex? pipiens* L.," by Mr. Coquillett; rather a worse guess than usual.

*Culex conservator*, new species. Fig. 56.

Antennæ with the tuft beyond the outer third, dark; air tube  $8 \times 1$ , a single hair at the middle; pecten not reaching one-third. Anal segment long with short gills.

Collected by Mr. Busck in a hollow tree in the village of St. Joseph, Trinidad. Also in hollow trees near Montserrat, Trinidad, and Fort de France, Martinique, but these are broken and we do not feel sure of them. All were labelled "*Aedes perturbans* Will." by Mr. Coquillett.

illett. Blanchard refers *perturbans* Will. to the genus *Wyeomia* (Sabethinæ) and makes it the same as *W. grayii* Theob. Apparently nobody knows what Williston's species really was; it may be our *C. conservator* or *C. divisor* or some other species, more probably the latter, we believe.

*Culex restrictor*, new species. Fig. 57.

Antennæ with the tuft near the outer third; upper head hair triple, lower single, long; lateral hairs in twos on the second to sixth abdominal segments. Air tube  $8 \times 1$ , the pecten to one-fifth; four single hairs on posterior margin. Lateral comb of the eighth segment large; anal gills small.

Collected by the junior author in a small hole in a tree in a ravine at Almoloya, Oaxaca, Mexico. Our larva pupated, but failed to emerge.

*Culex latisquamma* Coquillett. Fig. 58.

*Tinolestes latisquamma* Coquillett, Proc. ent., soc. Wash., vii, 185, 1906.

Antennal tuft at the outer third, dark; upper head tuft four, lower single; lateral hairs in four on the first segment, two long ones on the second, in twos but short on the third to fifth, one long one on the sixth. Air tube  $8 \times 1$ , pecten to one-third.

Collected by the junior author at Port Limon, Costa Rica, with *Deinocerites* in crab holes. The larvæ were not bred, although they lived a month and were brought back to Washington. Adults captured in the hole, which are in all probability adults of these larvæ, were named "*Aedes? nigricorpus* Theob." by Mr. Coquillett and later described as a new genus and species.

*Culex divisor*, new species. Fig. 59.

The characters are included in the table, all that can be demonstrated in the rather badly damaged material, which suffered in transit.

It was collected by Mr. Ulrich in Trinidad; ten specimens were bred from the same egg mass collected in a hollow bamboo joint. The egg mass was floating free, the eggs stuck together by their sides in the normal way. Mr. Coquillett has identified the adults as "*Aedes pertinans* Will.," which may be correct. The species *pertinans* has, however, been referred to the Sabethinæ, and we do not feel justified in accepting the same till someone has examined Williston's types.

Mr. Coquillett's results, especially in the genus *Culex*, have produced in our minds a feeling of most profound distrust, and we are not prepared to accept anything that he says without corroboratory evidence.

Genus *MOCHLOSTYRAX*, new.

Differs from *Culex* in the structure of the comb of the eighth segment, which consists of a single row of bars instead of a patch of scales. We had thought to call this genus *Melanoconion* Theob., but the type species of that genus is *atratus* Theob., of which the larva has been made known by Dr. Grabham (in Theobald, Mon. Culic., iii, 238, 1903 and Can. ent., xxxvii, 404, 1905). In neither place is the structure of the comb accurately stated, but it is said to consist of "numerous flattened elongate scales bordered with fine setæ." It is clear that no one would so describe a row of bars, and the species *atratus* must be referred as a typical *Culex* of that group that has a very long slender tube. Type, *M. caudelli*, new species.

Table of species.

1. Antennæ with the tuft at the middle, slight; tube with 15 hair tufts along the posterior line ..... *urichii* 2  
     Antennæ with the tuft from a notch beyond the middle..... 2
2. Air tube over four times as long as wide, slender, scarcely tapered, with slight terminal setæ ..... 3  
     Air tube not over four times as long as wide, stout at base and tapering, slightly curved forward with two stout hooks at tip..... 4
3. Bars of comb in a perfectly regular row, body glabrous..... *melanurus*  
     Bars of comb in an irregular row, body pilose..... *erraticus*
4. Bars of comb in a curved row; body pilose..... *pilosus*  
     Bars of comb in a straight row; body glabrous ..... 5
5. Comb of sixteen bars ..... *caudelli*  
     Comb of only eight bars..... *cubensis*

*Mochlostyrax urichii* Coquillett. Fig. 60.

*Melanoconion urichii* Coquillett, Can. ent., xxxviii, 61, 1906.

We have the larvæ from Mr. Urich from Trinidad, who says: "Often found associated with *Mansonia facipes* and occurring under the same conditions. Predominating color brown. During life the similarity of the two larvæ is marked."

*Mochlostyrax melanurus* Coquillett.

*Culex melanurus* Coquillett, Journ. N. Y. ent. soc., x., 193, 1902.

*Culex melanurus* Dyar, Journ., N. Y. ent. soc., x, 196, 1902.

*Culex melanurus* Dyar, Proc. ent. soc. Wash., v, 143, 1903.

*Culex melanurus* Dyar, Science, n. s., xvi, 672, 1902.

*Culex melanurus* Felt, Bull. 79, N. Y. Sta. Mus., 337, 1904.

*Melanoconion melanurus* Dyar, Journ. N. Y. ent. soc. xiii, 28, 1905.

*Culex melanurus* Smith, N. J. Agr. exp. Sta., Rep. Mosq., 322, 1905.

Occurs in the northern Atlantic States; we have it from New Hampshire, New York and New Jersey. The fully grown larva hibernates, which is the only known instance of such a habit.

*Mochlostyrax erraticus*, new species. Fig. 61.

The larva resembles that of *Culex salinarius*. The skin is densely covered with minute spiculæ, making it appear pilose. The air tube is long and straight, about six times as long as wide, has the pecten small, running to the basal third, followed by five moderate tufts on the posterior edge and two very short dorsal ones. The lateral comb of the eighth segment has the spines in a rather irregular row, not in the normal perfectly straight line, yet not doubled. We have the species from Dr. Dupree, Baton Rouge, Louisiana. It was identified as "*Melanoconion atratus* Theob." by Mr. Coquillett, but of course erroneously.

*Mochlostyrax pilosus*, new species. Fig. 62.

The upper epistomal hair is double, the lower single, the anteantennal tuft of four. Air tube straight along the front side, curved behind, the pecten not reaching one-half, composed of long spines; eight hair tufts on the posterior edge, the two within the pecten very long, the others shorter. Comb of the eighth segment of 15 thorn-shaped scales in a curved row.

The specimens were collected by the junior author in Santa Lucracia, Mexico, in cattle tracks filled with water in the edge of a swamp. They have the habit of lying on the back at the bottom. The adults were named "*Melanoconion atratus* Theob." by Mr. Coquillett.

*Mochlostyrax caudelli*, new species. Fig. 63.

The upper epistomal tuft has three hairs, lower three, the small tuft below eight hairs, the anteantennal tuft five hairs. Air tube straight or slightly concave before, curved behind, with a pair of hooks at the tip. Pecten very long, not reaching half way along the tube; seven tufts on the posterior edge, the two within the pecten

longest, the rest successively shorter; a single tuft on the side of the tube. Comb of sixteen bar-like spines in a straight row. Anal segment with complete chitinous ring, the gills very long, tapered. The body is without spicules.

Mr. Busck collected the specimens in a rather large pool in a palm swamp far from civilization at Arima, Trinidad. He says: "the larvæ are weakly looking small fellows, which lie on their backs with jaws upward and open. They feed on very minute animal life (Crustacean) which abounds in these pools; observed this habit both in nature and in captivity and bred so few (five specimens) because the rest died when the Crustaceans gave out."

The adults were named "*Melanoconion atratus* Theob." by Mr. Coquillett. We have it for Mr. A. N. Caudell, our friend and co-worker.

*Mochlostyrax cubensis*, new species. Fig. 64.

The specimens are badly damaged, but enough is left to give the specific characters. The tube is of the same shape as in *caudelli* and had apparently similar hair tufts. Pecten very long, not reaching half way along the tube. Lateral comb of the eighth segment of eight bars, stout, well separated, the upper ones smaller.

We have the specimens from Havana, Cuba, from Mr. John R. Taylor as "*Melanoconion atratus* Theob." the determination made by Mr. Coquillett, we believe.

Subfamily SABETHINÆ.

Table of genera.

- |   |                     |
|---|---------------------|
| 1. No lateral comb on the eighth segment.....                       | <i>Joblotia</i>     |
| Lateral comb present on the eighth segment.....                     | 2                   |
| 2. Air tube spicular; maxillæ heavily armed, raptorial.....         | 3                   |
| Air tube smooth; maxillæ without heavy armature, not raptorial..... | <i>Hyomyia</i>      |
| 3 Head normal, the mouth parts not visible from above.....          | <i>Sabethoides</i>  |
| Mandibles and maxillæ visible from above.....                       | <i>Lesticocampa</i> |

Genus JOBLOTIA Blanchard.

*Trichoprosopon* Theobald (not *Trichoprosopus* Macquart), Mon. Culic., ii, 283, 1901.

*Joblotia* Blanchard, Cont. rent. heb. Soc. Biol., liii, 1045, 1901.

*Joblotia niveipes* Theobald. Fig. 65.

*Trichoprosopon niveipes* Theobald, Mon. Culic., ii, 285, 1901.



*Joblotia niveipes*, Blanchard, Les Moustiques, 429, 1905.

*Joblotia niveipes* Goeldi, Os Mosq. no Para, 120, 1905.

Prof. Goeldi has described and figured the larvæ from Brazil. He found them in the water in the leaves of Bromelias, in the axils of banana leaves and in holes in fallen trees. The species is distributed throughout the moist tropics. Mr. Busek collected larvæ in Trinidad from cacao husks and the junior author found them in cocoanut shells and cacao husks at Puntarenas, Costa Rica, and Sonsonate and Izalco, Salvador. The water in which they occur is very dirty, of a thick consistency. The eggs are laid in rafts, erect as in *Culex*, but of circular outline, not elliptical. Larvæ which were brought home lived for four months in the laboratory, perhaps delayed in development by the absence of their natural rich food.

#### Genus SABETHOIDES Theobald.

*Sabethoides* Theobald, Mon. Culic., iii, 328, 1903.

*Sabethoides* Blanchard, Les Moustiques, 423, 1905.

We are not acquainted with the larva of the typical species of this genus (*confusus* Theob.), but use the name on the supposition that *undosus* Coq. has been correctly referred generically.

#### *Sabethoides undosus* Coquillett. Fig. 66.

*Sabethoides undosus* Coquillett, Proc. ent. soc. Wash., vii, 186, 1906.

We have the larvæ from Mr. Urich in Trinidad, who got them in bamboo joints in St. Ann's Valley. Mr. Busek also collected them and observed that they were predaceous, as is obvious from the structure of the maxillæ.

#### Genus *Lesticocampa*, new.

Differs from all the other Sabethid larvæ by the remarkably developed mouth parts; the maxillary palpi are much like the antennæ in size and shape; the maxillæ are very large and project twice as far as the antennæ. Type, *L. lunata* Theob.

#### *Lesticocampa lunata* Theobald. Fig. 67.

*Wyomyia lunata* Theobald, Mon. Culic., ii, 279, 1901.

*Joblotia lunata* Theobald, Mon. Culic., iii, 336, 1903.

Described from Brazil. Our larvæ are from Mr. Urich in Trinidad. He got them in Arima, in Bromelia water. They are probably



predaceous on the other larvæ living in the Bromelia leaves. The identification is by Mr. Coquillett; we have no means of checking it.

#### Genus WYEOMYIA Theobald.

*Wyeomyia* Theobald, Mon. Culic., ii, 267, 1901.

*Limatus* Theobald, Mon. Culic., ii, 349, 1901.

*Simondellea* Laveran, in Simond, C. rend. heb. Soc. Biol., liv, 1158, 1902.

*Phoniomyia* Theobald, Mon. Culic., iii, 311, 1903.

*Dendromyia* Theobald, Mon. Culic., iii, 313, 1903.

#### Table of species.

1. Anal processes two, the upper pair aborted.....2  
    Anal processes equally developed.....3
2. Tube and plate without basal infuscation.....*smithii*  
    Tube and plate with heavy black basal ring.....*asullepta*
3. Lateral comb of the eighth segment of six separate teeth.....*durhami*  
    Lateral comb of the eighth segment of many teeth in a long line.....4
4. Comb a long row of single teeth, nowhere doubled.....5  
    Comb of teeth in a band, at least in part two rows deep.....7
5. Tube with delicate scattered tufts, dark with pale tip.....*grayii*  
    Tube with coarse single hairs, all pale.....6
6. Air tube  $3\frac{1}{2} \times 1$ ; spines of comb scales shorter than the base ....*ochrura*  
    Air tube  $5 \times 1$ ; spines of comb scales longer than the base ....*telestica*
7. Tube with short spines resembling pecten.....8  
    Tube without false pecten.....9
8. Pecten of the air tube 3 spines preceded by a hair.....*ulocoma*  
    Pecten of the air tube without preceding hair.....*autocratica*
9. Tube strongly tapered outwardly; tube and plate without black ring.  
    .....*longirostris*  
    Tube straight, tapered only near tip; tube and plate with back basal  
    ring.....*aporonoma*
10. Tube and plate with black basal ring; subventral tuft short....*aporonoma*  
    Tube and plate without black ring; subventral tuft long.....*hemisagnosta*

#### *Wyeomyia smithii* Coquillett. Fig. 68.

*Culex pungens* Smith, (not Wiedemann), in Howard, Mosq., 83-90, 1901.

— — — Smith, Ent. news, xii, 93, 125, 1901.

*Aedes fuscus* Smith, (not Osten-Sacken). Ent. news xii, 189, 220, 1901.

*Aedes smithii* Coquillett, Can. ent., xxxiii, 260, 1901.

*Aedes smithii* Smith, Ent. news, xii, 254, 1901.

*Aedes smithii* Dyar, Journ. N. Y. ent. soc., ix, 178, 1901.

*Aedes smithii* Smith, Journ. N. Y. ent. soc., x, 10, 1902.

*Aedes smithii* Dyar, Proc. ent. soc. Wash., v, 51, 1902.

*Aedes smithii* Johannsen, Bull. 68, N. Y. Sta. Mus., 426, 1903.

*Verrallina* ? *smithii* Theobald, Mon. Culic., iii, 295, 1903.

*Aedes smithii* Felt, Bull. 79. N. Y. Sta. Mus., 341, 1904.

*Aedes smithii* Blanchard, Les Moustiques, 403, 1905.

*Wyeomyia smithii* Dyar, Journ. N. Y. ent. soc., xiii, 23, 1905.

*Wyeomyia smithii* Smith, N. J. Agr. exper. sta. Rept. Mosq., 345, 1905.

*Wyeomyia smithii* Mitchell, Can. ent., xxxvii, 332, 1905.

The larvæ occur in the leaves of the pitcher plant, *Sarracenia purpurea*, wherever that grows. This is its only place of occurrence; the record from Bromelia leaves in Florida, made by Mr. Coquillett, is obviously erroneous. That is some other species which we hope will be collected again.

***Wyeomyia asullepta* Theobald. Fig. 69.**

*Dendromyia asullepta* Theobald, Mon., Culic., iii, 315, 1901.

*Dendromyia asullepta* Blanchard, Les Moustiques, 426, 1905.

Described from Guiana. We have the larvæ from Mr. Ulrich in Trinidad. The determination seems plausible and we have not rejected it.

***Wyeomyia durhami* Theobald. Fig. 70.**

*Limatus durhami* Theobald Mon. Culic., ii, 350, 1901.

*Simondella curvirostris* Laveran, in Simond, C. R. heb. Soc. Biol., liv, 1158, 1902.

*Aedcomyia curvirostris* Neveau-Lemaire, Mem. soc. zool. France, xv, 223, 1902.

*Limatus durhami* Blanchard, Les Moustiques, 429, 1905.

*Limatus durhami* Goeldi, Os Mosq. no Para, 122, 1905.

Prof. Goeldi found the larvæ in water in the forest, rich in detritus of leaves and flowers. Mr. Busck got them in Trinidad in a hollow tree, in a broken cacao shell with *Joblotia*, in a thick rotten fluid, and in a broken rotten Calabash-fruit in the forest far from civilization. Mr. Ulrich also sent us the species from Trinidad. The junior author collected them at Sonsonate and Izalco, Salvador; Puntarenas, Esparta and Port Limon, Costa Rica. They were in cacao husks. The species is evidently widely spread in the moist tropics.

***Wyeomnina grayii* Theobald. Fig. 71.**

*Wyeomyia grayii* Theobald, Mon. Culic., ii, 235, 1901.

*Wyeomyia perturbans* Blanchard, Les Moustiques, 424, 1905.

Described from Jamaica. Our larvæ were taken by Mr. Busck in Trinidad, Tobago Island and San Domingo, in a hollow tree, bamboo stalk and Bromelia leaves. Prof. Blanchard refers the name as a synonym of *Aedes perturbans* Williston; but Mr. Coquillett has made

an entirely different identification of *perturbans*. We accept the name *grayii* for our larva tentatively (see remarks under the following species).

*Wyeomyia ochrura*, new species. Fig. 72.

The air tube is pale, with concolorous tip, with coarse single hairs. Pecten teeth of the comb of the eighth segment simple. Subventral tuft of the anal segment, large and stellate; lateral hair single. Abdominal hairs tufted. Mr. Busck collected the larva at San Domingo, in the leaf stalks of young palms; it was named "*Dendromyia* sp." by Mr. Coquillett. We have it also from Mr. Urich in Trinidad, named "*Phoniomyia longirostris* Theob." and from Surgeon W. Campbell in Dominica named "*Wyeomyia grayii* Theob." What it would have been named the next time it occurred, we do not know, as we propose to fix it now by a name of its own.

*Wyeomyia ulocoma* Theobald. Fig. 73.

*Dendromyia ulocoma* Theobald, Mon. Culic., iii, 313, 1903.

*Dendromyia ulocoma* Blanchard, Les Moustiques, 426, 1905.

Described from Guiana. We have it from Mr. Busck's collecting in Trinidad and San Domingo. The larvæ occurred in the flower sheaths of wild *Canna*, where there is very little water and that of a slimy nature. There is but a narrow space between the sheath and bud for the larvæ to live in. The eggs are laid singly, but in large numbers in the uppermost, just opening flower. They are elliptical and black. We have nothing to urge against the determination, nor in its favor either. The species is evidently a very specialized one.

*Wyeomyia longirostris* Theobald. Fig. 74.

*Wyeomyia longirostris* Theobald, Mon. Culic., ii, 275, 1901.

*Wyeomyia trinidadensis* Theobald, Mon. Culic., ii, 277, 1901.

*Phoniomyia longirostris* Theobald, Mon. Culic., ii, 311, 1903.

*Phoniomyia longirostris* Blanchard, Les Moustiques, 425, 1905.

Described from Brazil and recorded from Trinidad. Mr. Busck got the larva in Tobago Island in the base of a leaf of *Bromelia*. Mr. Urich has sent it to us from Trinidad. The air tube is stout, strongly tapered outwardly, pale with single stout feathered hairs. The anal segment has the subventral tuft short and stellate, the lateral

tuft two-haired. Pecten of the eighth segment of very long fringed teeth. The identification seems plausible and we have therefore accepted it.

*Wyeomyia aporonoma*, new species. Fig. 75.

The air tube is pale, straight, tapered only near tip, with scattered single hairs. Lateral comb of the eighth segment of scales in a broad band, beginning above in single teeth, then a double row below, the teeth smaller. Anal segment with the subventral tuft small and stellate. Anal plate and tube with a black basal border. Body hairs fine, stellate.

The junior author got the larvæ at Sonsonate and San Salvador, Salvador; Santa Lucrecia, Mexico; Port Limon, Costa Rica. They were in cocoanut shells, a hollow in a stump of a banana tree and cacao shells. The species was named "*Dendromyia? quasiluteoventralis* Theob." but we have been averse to adopting a name so doubtful.

*Wyeomyia telestica*, new species. Fig. 76.

The larva is allied to *W. ochrura* D. & K., described above. It was sent to us by Mr. Urich from Trinidad, bred from Bromelia water. The adults were named "*Dendromyia quasiluteoventralis* Theob." by Mr. Coquillett.

*Wyeomyia autocratica*, new species. Fig. 77.

This species is allied to *W. longirostris* Theob., but differs markedly in the structure of the tube and comb. The tube bears a false pecten as in *W. ulocoma* Theob. but otherwise these larvæ are not much alike. The specimen was received from Mr. Urich in Trinidad, bred from Bromelia water with the preceding. Mr. Coquillett did not find the adult different from the foregoing species.

*Wyeomyia hemisagnosta*, new species. Fig. 78.

Allied to *W. aporonoma* D. & K., but entirely without the broad black margin of the anal plate; the subdorsal abdominal hairs are long in twos and threes, while they are short, stellate tufts in *aporonoma*. They were collected by the junior author at Sonsonate, Salvador, in cacao shells, associated with *Aedes cyaneus* and *W. durhami* and at Port Limon, Costa Rica.

JOURNAL  
OF THE  
**New York Entomological Society.**

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EDITED BY HARRISON G. DYAR.

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Publishes articles relating to any class of the subkingdom Arthropoda, subject to the acceptance of the Publication Committee. Original communications in this field are solicited.

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EDITORIAL.

The article which comprises the present issue was first published as author's separates on March 14, 1906. The new species described in it should be credited with that date. It is, perhaps, advisable to mention that this paper was not "distributed by the Government" as has been erroneously stated in print (*Ent. News*, XVII, 181, 1906).

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We note the formation of the "Entomological Society of America," having been formed at the Philadelphia meeting of the Entomological Club of the American Association for the Advancement of Science. This appears to be a new society, not a new name for the Entomological Club. We fail to see any necessity for this organization, or any special purpose in its formation. No place of meeting is mentioned, and it must either meet in some later selected place, in which case it will only uselessly compete with the local society there, or meet with the American Association for the Advancement of Science, to uselessly compete with the Entomological Club. No mention of a publication appears with the prospectus, and we heartily hope none will be attempted. None of the present entomological societies are able to pay for their publications out of their subscriptions, except "Entomological News," so that a reduction in the number of publishing societies would seem to be in order, rather than an increase. The American entomologist is a rather rare species, and the number of

journals he has to purchase, to keep up to date, is already too great. Unless the Entomological Society of America can absorb one or more of the existing societies, we think its formation not only useless, but ill-advised.

A recent article by Mr. Witmer Stone (*Science*, n. s., xxiv, 560, 1906), brings forward again the question of determining the types of genera by the first species method. The article favors the method and is in accordance with our own views. We hope that the International Zoölogical Congress will consider this question at its meeting next summer and, if possible, adopt the principle. A question of nomenclature, which we have not seen discussed, and which our codes do not cover, is the matter of the identification of type species. This is equally pertinent by the elimination method of fixing types or any other method. If (by any method) a type is found for a genus, the question arises as to what that species was. The author may have mentioned an old species. Is the type of the genus the old species mentioned, or is it the species the author had before him under that name, perhaps a very different species, misidentified? There ought to be a rule to solve such cases.

#### BOOK NOTICE.

*Entomology, with Special Reference to its Biological and Economic Aspects.* By JUSTUS WATSON FOLSOM, Sc.D. Philadelphia, P. Blakiston's Son & Co., 1906.

This book makes a distinct departure from our usual text-books on entomology, in that classification and taxonomy are reduced to a minimum, their place being taken by a general account of the structure and histology of insects, with their habits, adaptations, and the many interrelations that the subject suggests. It is interesting reading to even advanced students and a mine of information to the beginner. We commend the work heartily. It should be read in conjunction with some other work dealing more fully with classification.



## PROCEEDINGS OF THE NEW YORK ENTOMOLOGICAL SOCIETY.

MEETING OF MAY 16, 1905.

(Continued from Vol. XIV, p. 112.)

Mr. Roberts made some remarks on the Haliplidæ and exhibited his collection in this family. He stated among other things that this family had been in more or less confusion for years and no good structural characters had been found to differentiate the species or to separate the males from the females. After considerable investigation he had noted that there was great variance in the shape and character of the prosternal process in the different species and also in the males the second and third joints of the front tarsi were enlarged or flattened and these joints were in some cases lobed, excavated or tuberculated while in the females these joints were simple. He had found that the shape of the coxal plates was to be depended upon as a good character in connection with the sexual characters referred to above. He briefly spoke of the distinguishing characters of several species and discussed their habits.

Mr. Davis exhibited several interesting insects chiefly Orthoptera from the Pine Barrens of New Jersey among which were: *Conocephalus caudellianus* Davis taken in an overgrown cranberry bog and closely resembling *C. robustus*; *Conocephalus nebrascensis* Bruner which is not in Smith's List of New Jersey Insects and, so far as he was aware, has never been reported east of the Mississippi Valley; *Orchelimum erythrocephalum* Davis which resembles *O. vulgare* but having a very red face and head; *Ophiogomphus johannus* Needham, a dragon-fly, new to the List of New Jersey Insects, collected at Hewitt, N. Y., in June; *Ophiogomphus rupinsulensis* collected in Northern New Jersey near Suffern, N. Y.; *Axion tripustulatum*, a coccinellid beetle found at Lakehurst, N. J., on post oaks (*Quercus minor*) that had been attacked by the scale insect *Kermes pubescens*. This scale insect seemed to be also an addition to the New Jersey List.

MEETING OF JUNE 6, 1905.

Held at the American Museum of Natural History. The Vice-president, C. W. Leng, presided with seven members present.

On motion of Mr. Watson, Dr. Love was elected to succeed Mr. Brues as a member of the Publication Committee.

Mr. Joutel stated that he wished to place on record the capture of *Merium proteus* Kirby, a longicorn beetle new to New Jersey.

Mr. Groth remarked that he had noticed the copulation of the males of *Rhyssa lunator* and *atrata* with the females before the emergence of the latter from the tree.

Mr. Davis exhibited live specimens of *Elaprus ruscarius* which had a pronounced stridulation.

Mr. Bueno exhibited a specimen of *Ranatra* which stridulates with its legs.

MEETING OF OCTOBER 3, 1905.

Held at the American Museum of Natural History, with seven members present. In the absence of the President and Vice-President, Mr. Harris presided.

The regular order of business was suspended on motion and Mr. Davis proposed Professor W. M. Wheeler, of the American Museum, as an active member.

Dr. Horn's recent paper on the Cicindelidæ in the Deutsche Ent. Zeitung was discussed by Mr. Harris and Mr. Schaeffer.

#### MEETING OF OCTOBER 17, 1905.

Held at the American Museum of Natural History with twelve members and three visitors present. Mr. Roberts in the chair.

On motion the Secretary cast one ballot for the election of Professor Wheeler as an active member of the Society.

Rev. R. E. Brown was proposed by Mr. Groth as a corresponding member.

The President announced that he had accepted the resignation of Mr. Bueno from the field committee.

Mr. Schaeffer exhibited a few species of Cicindelidae with the following remarks on some of the species:

According to Dr. Horn *Cicindela viridisticta* does not occur in our fauna; the species standing under this name in our lists is *C. arizonensis* which was described by Bates from material collected in southern Arizona by Morrison. The specimen shown by Mr. Schaeffer was one of Morrison's catch. *C. wickhami* is very near *arizonensis* and *viridisticta* and very likely still stands in some collections as *viridisticta*. A few specimens of a variety of *hemorrhagica* seemingly common in southwestern Utah which comes very close to the variety *arizonæ* as well as a fine series of *oregona* from southeastern Utah ranging from brown to dark blue were exhibited; one of the specimens of the series being very close to Casey's *depressuta* and another almost Leng's *maricopa*. A few specimens of *C. obsoleta* var. *santa claræ* were taken in southern Arizona this year. The typical form is bright green with the middle band and humeral and apical lunules broken up into more or less rounded spots. One of the specimens had the markings entire and connected at the side margin; another specimen was one of the purple colored varieties mentioned by Bates under his description of *C. santa claræ*; this specimen had the markings typical, but in addition, a small white line between the middle band and humeral lunule. *C. santa claræ* occurs on the plains near the foothills of the Huachuca Mountains. It is a strong flier and can be considered rare as only a few specimens were taken. Three specimens of the very rare *Amblychila baroni* were exhibited which were captured under large stones in a somewhat shaded but not moist situation.

Mr. Barber read an account of the summer's experience collecting in the Huachuca mountains with Messrs. Beyer and Schaeffer. He gave a description of mountains, climate and people and mentioned the general results of the collecting and closed with an account of the more common plants and animals found there.

#### MEETING OF NOVEMBER 21, 1905.

Held at the American Museum of Natural History. President C. H. Roberts in the chair with ten members and three visitors present.

The Librarian, Mr. Schaeffer reported the following additions to the Library: Zeitschrift für Wissenschaftliche Insekten-biologie, Vol. I, Nos. 5-11.

- Museum of the Brooklyn Inst. of Arts and Sciences, Report for 1904.  
 Entomol. Bericht. Nederlandsche Entomologische Ver., 1904, Nos. 19 and 20; 1905, Nos. 21-24.  
 Wiener Ent. Zeit., Vol. XXIV, Nos. 5-10.  
 Canadian Entomologist, Vol. XXXVII, No. 11.  
 Aquatic Nematocerus Diptera II; by O. A. Johannsen, 1905.  
 1st and 2d Rep't Entomologist of Montana, December, 1903, 1904.  
 Proc. Amer. Philos. Soc., Vol. XLVI, Nos. 179-180.  
 Deutsche Entomol. Zeitschrift, 1905, No. 2.  
 Zool. Record, Vol. XLI, 1904; Insects by Dr. Sharp.  
 Berliner Entom. Zeitschrift, Vols. XLVII, Nos. 1-4; XLVIII, Nos. 1-4; XLIX, Nos. 1 and 2; XLV, Nos. 3 and 4.  
 Bull. de la Soc. Imperiale des Natur., 1904, No. 4.  
 Verhandl. d. K. K. zool. bot. Gesellschaft Wien, Vol. LV, Nos. 7 and 8.  
 The Rumford Fund of the American Acad. of Arts and Sciences, 1905.  
 Anales del Museo Nacional de Buenos Ayres, Tome IV, Ser. III, 1905.  
 The Insect world, Gifu, Japan, Vol. IX, Nos. 5-9.  
 Proc. Amer. Acad. Arts and Sciences, Vol. XLI, Nos. 3-7.  
 Proc. U. S. Nat. Museum, Vol. XXIX, Nos. 1416, 1417, 1419, 1420, 1421, 1423, 1424.

Rev. R. E. Brown was elected a corresponding member on motion of Mr. Joutel.

Mr. Davis proposed Mr. Alfred C. Burrill, 317 West 56th st., as an active member.

The resignation of Mr. Ludwig Riederer as an active member was accepted with regret.

Mr. Schaeffer exhibited a few of the rarer or new species of Coleoptera taken this year in the Huachuca Mountains of Arizona, also a new *Oncideres* from Texas and *Oncideres irroratus* taken by Professor Snow in southern Arizona, which is new to the United States.

Mr. Leng read a paper on "Collecting in the Adirondacks." He described the localities in the vicinity of Mt. Marcy and Whiteface, referring especially to the great accumulation of decayed trees and the deep damp moss found near the summits of those mountains. He also described the mid-day flight of insects of all orders, but especially Coleoptera, noticed in July at the rocky top of Whiteface Mountain, the insects being apparently carried unwillingly to the top by the air currents. Mr. Barber said that he had observed the same flight at the top of Mt. Katahdin in Maine and Mrs. Slosson has also noticed the same occurrence on Mt. Washington.

Mr. Leng exhibited a part of the beetles taken, among which a number of northern species were noticeable. The Carabidæ were strongly represented and the Coccinellidæ were particularly numerous.

Mr. Davis read a paper entitled "Mantispas at Lakehurst, New Jersey." He stated that both *Mantispa brunnea* Say and *Mantispa interrupta* Say have been reported from New Jersey, but the former species has been considered quite rare. Recently a number of *M. brunnea* have been taken from the small oaks at Lakehurst, N. J., during July and August. A single male of this species was captured on May

30, 1905, and other specimens have been taken as late as September. But one specimen of *M. interrupta* has been found at Lakehurst which was captured July 30, 1905.

Both of these species of *Mantispa* seem to be widely distributed in the United States, particularly *M. brunnea*, which, according to Hagen, occurs from the Atlantic to the Pacific Ocean.

Mr. Barber made some remarks concerning *Pentatoma ligata* and exhibited specimens of this species as well as *P. juniperina* with which it has often been confused. Among other things he said that this insect had lately come into prominence as an enemy of the cotton plant in various parts of Northern Mexico as shown in a recent article in a Bulletin of the Division of Entomology of Washington, where a full account of its habits, life-history and distribution were given. Mr. Barber also spoke of the distribution of *P. ligata* and stated that he has found this species very abundant in the Huachuca Mountains, Arizona, where in the gardens it was partial to Asparagus.

#### MEETING OF DECEMBER 5, 1905.

Held at American Museum of Natural History. President C. H. Roberts in the chair with nine members and one visitor present.

Mr. Dickerson exhibited specimens of *Tomicus calographus* Lec. with eggs, larvæ and several interesting specimens of their borings beneath the bark of pine which he had found at Jamesburg, N. J. The specimens of bark borings showed all of the stages of their work from the formation of the nuptial chamber just after the entrance of the beetles, the primary and secondary galleries of the adults with their egg cavities from which the hatched larvæ worked out at right angles and at the end of these larval galleries were seen the pupal chambers. Several coleopterous enemies of this species were also exhibited.

Mr. Leng exhibited his collection of *Notiophilus* which genus he stated was in a very unsettled state and needed revision, a task which was being undertaken by Mr. Fall. He noted the well defined characters of certain species and remarked that he possessed several specimens which did not seem to fit the description of the known species and were therefore probably new. He remarked upon their habits and spoke of the difficulties in capturing these insects.

#### MEETING OF DECEMBER 19, 1905.

Held at the American Museum of Natural History. President C. H. Roberts in the chair with eleven members and one visitor in attendance.

On motion of Mr. Leng the secretary cast one ballot in favor of the election of Mr. Alfred C. Burrill as an active member of the society.

In pursuance of the custom at the last meeting in December the president appointed as a committee to nominate officers for the coming year the following: Messrs. Joutel, Watson and Zabriskie.

Mr. Bueno exhibited a collection of aquatic Hemiptera obtained from Costa Rica and made some remarks on the species contained in the collection.

Mr. Joutel gave an interesting account of some of the results and observations obtained by him in the investigation of the white ants and spoke of the Protozoan parasites which infest the intestine.

Mr. Barber exhibited all of the members of the genus *Dendrocoris* of the family Pentatomidæ among which was the new species (*D. schæfferi*) described by him from Brownsville, Texas. He spoke of the distinctive characters of each of the species, recording their distribution and habits so far as known.

#### ANNUAL MEETING, JANUARY 2, 1906.

Held at the American Museum of Natural History. President C. H. Roberts in the chair with ten members and one visitor present.

Mr. Joutel, of the nominating committee, announced that the committee had decided to make no change in the present officers for the ensuing year. On motion of Mr. Joutel the secretary cast one ballot in favor of the reelection of the present officers.

The president appointed the following committees :

Auditing committee, Messrs. Harris, Southwick and Bueno.

Field committee, Messrs. Davis and Engelhardt.

Delegates to Scientific Alliance, Messrs. Roberts, Groth and Wheeler.

Mr. Davis proposed Mr. Ignaz Matausch, 609 Columbus Avenue, City, as an active member.

Mr. Harris exhibited a box of exotic cicindelas.

#### MEETING OF JANUARY 19, 1906.

Held at the American Museum of Natural History. President C. H. Roberts in the chair with thirteen members in attendance.

On motion of Mr. Groth the Secretary cast one ballot for the election of Mr. Matausch as an active member of the Society.

Mr. Leng exhibited his collection of *Nomaretus* and made a few remarks concerning some of the species.

Mr. Schaeffer exhibited a number of interesting beetles, among them *Ludius peninsularis* Champ. from Arizona which he said was overlooked by Dr. Horn in his paper on the species of this genus. It resembles *L. texanus* very much but is distinguished principally by the prosternal process being abruptly declivous behind the coxæ. Also was shown a large black species which by the form of the metasternum is in some way intermediate between the genera *Ludius* and *Orthostethus*. Also a specimen of *Cotalpa subscibrata* Wickham, lately described, which he had received a few days ago from Mr. Knaus. Mr. Schaeffer remarked that this species will not hold good and in his opinion is a coarsely punctate form of *Cotalpa lanigera*.

#### MEETING OF FEBRUARY 20, 1906.

Held at the American Museum of Natural History, Vice-President C. W. Leng in the chair with eleven members and one visitor in attendance.

The librarian, Mr. Schaeffer, reported the receipt of the following exchanges :

Canadian Entomologist, XXXVII, No. 12 ; XXXVIII, No. 1.

Bulletino della Soc. Ent. Italiana, XXXVI, No. 4.

Proc. U. S. Nat'l Mus., Vol. XXIX, No. 1432, pp. 501-515.

Proc. Amer. Acad. Arts and Sciences, Vol. XLI, Nos. 14-19 (1906).



Berliner Entom. Zeitschrift, XLIX, Nos. 3 and 4; L, Nos. 1 and 2.

Mus. Brooklyn Institute, Science Bulletin, Vol. I, No. 7.

35th Ann. Rept. Ent. Soc. Ontario, 1904.

Revista Mus. Paulista, Vol. VI (1904).

Insect World, Vol. IX, No. 12; Vol. X, No. 1.

Zeitschrift f. Wissenschaftliche Insekten biologie, Vol. I, No. 12; Vol. II, No. 1.

Mitteilungen d. Schweiz. Ent. Gesellschaft, Vol. XI, No. 3.

Anales del Museo Nacional de Buenos Ayres, Ser. III. Tome V.

Entom. Tidskrift, 1905, Nos. 1-4.

Wiener Entom. Zeitung, Vol. XXV, No. 1.

Mr. Davis proposed as an active member of the Society Miss Francis J. Thompson, 46 Stuyvesant Pl., New Brighton, Staten Is.

Mr. Watson proposed Mr. Harvey Mitchell, Westwood, N. J., and Mr. Gayland C. Hall, 409 W. 145th St., as active members.

The resignation of Professor W. G. Johnson as an active member was accepted.

Mr. Engelhardt entertained the Society with an interesting account of his collecting trip to southwestern Utah during the summer of 1905 and exhibited a box of the rarer insects taken by him on the trip.

Mr. Dickerson read a paper on *Hyperaspis signata* and exhibited a collection of a long series of this species, showing a number of interesting varieties. He spoke of the synonymy, and of the structural and color characteristics, habits of the larvæ and adult. He also exhibited specimens of the cottony maple scale upon which the larvæ feed.

Mr. Davis exhibited a *Papilio* and a small crab spider, the former having fallen a victim to the poisonous bite of the spider.

Mr. Matausch exhibited a case containing many interesting exotic moths.

Mr. Leng exhibited a box containing a map of the United States upon which specimens of *Cicindela repanda* were pinned according to their known geographical range.

#### MEETING OF MARCH 20, 1906.

Held at the American Museum of Natural History.

President C. H. Roberts in the chair with eleven members present.

On motion of Mr. Southwick, Miss Frances Thompson, Mr. Gayland C. Hall and Mr. Harvey Mitchell were elected active members of the Society.

Mr. Joutel proposed the name of Mr. E. A. Schwarz as an honorary member of the Society and upon motion was unanimously elected.

Dr. Zabriskie delivered a talk on the microscopical examination of the external structure of hemipterous insects of the genera *Anasa*, *Lygæus* and *Alydus*. The address related chiefly to curious structures which are seen after suitable bleaching and microscopical mounting of dissections of these insects and which are found in the antennæ, mouth parts, legs, pronotum, coxæ and wings. Especially noticeable in the antennæ is a small cup-like, supplementary joint, between the third and fourth joints, thus far found only in both sexes of *Anasa tristis*. In the mouth parts attention was directed to the slender, ornamented labrum; the form and arrangement of the barbs on the delicate pair of lancets; the varying form of the tips of the pair of stout lancets and



he two unique, stout, short, conical spines always found in the same relative position near to and on opposite sides of the cleft and close to the base of the second joint of the beak, in both sexes of each species under examination. The anterior legs present a very interesting comb of about thirty spines, of nearly equal length and diameter, lying in a straight row across the inner side of the apex of the tibiae, apparently useful for toilet purposes. The pronotum and the regions of the coxæ were mentioned as showing an extraordinarily large size of pore-canals, passing through the thick chitin, and probably affording means of exudation of secretions. In the description of the wings the most striking feature was the curious interlocking apparatus. The fore wing, or hemelytron, has on the under surface at the posterior edge, in the acute angle of the anal cell or clavus, a prominence and this prominence has a deep pit. The anterior edge of the pit has a single or multiple comb of depending spines, and the posterior edge has a projection furnished with apparently fish-scale-like spines, all provisionally named the "wing lock." The hind wing has the costal or anterior edge upturned for a short distance, directly opposed to the "wing lock," which upturned edge is also furnished with fish-scale-like spines, this upturned edge being provisionally named the "wing hasp." When the wings are expanded the hasp slides in the lock and is securely held. When the wings return to a position of rest the hasp easily slides out of the lock.

The address was illustrated by fifty-six lantern slides, of the speaker's own preparation, consisting of etchings on sheet gelatine, mounted between two cover glasses of regulation sized lantern slides, the etchings being tracings of pen sketches through the camera lucida from microscopical mounts of his own dissections.

Mr. William T. Davis presented some remarks on "Some Interesting Insects from New Jersey."

*Ptynx appendiculatus* Fab., an ant-lion, is mentioned from Brazil by Hagen. Mrs. Slosson captured it in Florida. According to Mr. Nathan Banks it has been found in North Carolina, and lately in New Jersey. The specimens exhibited both came from New Jersey. One was captured by Mr. Frank E. Watson at South Lakewood on July 11, 1902, and the other was collected on July 30, 1905, at Lakehurst.

*Panchlora viridis* Burm. is a delicately colored West Indian cockroach collected by Mr. James Chapin in a house on Staten Island about the first of March. This species has previously been reported from the vicinity of New York.

*Ecanthus pini* Beut. The pine tree cricket was originally described from Windham County, Conn., by Mr. Beutenmüller. The specimens exhibited came from Lakehurst, N. J., collected in July and September.

The moth *Pygarctia abdominalis* Grote is recorded from Florida, but the specimen shown was beaten from a cedar tree at Lakehurst, N. J., on the twenty-ninth of May, 1905. The specimen was shown to Professor J. B. Smith and he wrote as follows: "This is an altogether new locality and a great extension of the range of this insect. Its capture and the circumstances under which it was taken are well worth recording."

A specimen of *Necrophorus pustulatus* Hirsch was exhibited which was captured on Staten Island beneath an electric light on July 19, 1905. The species is not mentioned in the New Jersey, Washington, or Cincinnati lists of Coleoptera. It is, however, recorded from the vicinity of Buffalo and Dr. Horn records its distribution from the New England States to Texas.

*Cuterebra buccata* Fab. This fly has been reported from New Jersey but Mr. Davis called attention to the beautiful and conspicuous colors of the eyes of a specimen taken at Lakehurst, N. J.

Mr. Roberts after urging the importance of a careful study of the structure of Coleoptera as shown in the antennæ, legs and parts of the under surface of the body and referring to the splendid results obtained therefrom by Dr. Sharp, Mr. Fall and others, exhibited a few specimens of Dytiscidæ and called attention to some of their peculiarities of structure. A deep round depression or pit in the last abdominal segment of *Calambus farctus* male, at once distinguishes it from other species. Another undescribed form, referred to as *tuberculiiventris* had depressions so placed as to leave a distinct broad, flattened, tubercle on each side of the same segment. With *Calambus dispar* Lec. (*H. dissimilis* of G. and H.) was mixed in most collections, a form undescribed but which was also readily separated by differences of the last segment. *C. dispar* has a narrow but distinct groove extending perpendicularly nearly its whole length while the species mixed with it and rather closely resembling it, has the same segment shallowly and horizontally depressed.

Mr. Roberts showed specimens of Fall's *Calambus pedalis* and *C. femoratus* and called attention to their peculiar leg structure. Finally reference was made to the antennal structure of *Hydroporus diversicornis*, *difformis*, *oblongus* and an undescribed species from the middle west with abnormal antennæ which at once separated them from each other and all other species of the genus.

The separating of two species of *Hydroporus* from Newfoundland almost identical in general form, punctuation, color, etc., by differences in the antennæ and front tarsi was especially interesting.

Specimens of all of the species referred to were shown, both male and female, but the characters spoken of were almost entirely those of the male.

#### MEETING OF APRIL 3, 1906.

Held at the American Museum of Natural History, Vice-President C. W. Leng presided with nine members present.

Mr. Davis exhibited two boxes of galls illustrating the work of gall insects on the following plants: rose, blackberry, raspberry and Potentilla.

Mr. Davis also exhibited a number of species of Cicadas, among which were *Tettigæa hieroglyphica*, *Cicada tibicen*, *C. pruinosa* and *C. canicularis*. The three last-named having for some time been considered as one species but Mr. Davis and Mr. Joutel consider them three distinct species, basing their conclusions upon color, structural and vocal differences.

#### MEETING OF APRIL 17, 1906.

Held at the American Museum of Natural History. President C. H. Roberts in the chair with eleven members and one visitor present.

The librarian reported the receipt of the following exchanges:

Stettiner Entom. Zeitung, Vol. LXVI, Nos. 1 and 2.

Bulletino della Soc. Entom. Italiana, Vol. XXXVII, No. 1.

Insect World, Vol. X, No. 2.

Canad. Entom., Vol. XXXVIII, Nos. 3 and 4.

- Proc. Amer. Phil. Soc., Vol. XLIV, No. 181.  
Proc. Amer. Acad. Arts and Sciences, Vol. XLI, Nos. 20-24.  
U. S. Dep't. Agric. Division of Entom., Bull. No. 56.  
Delaware Agr. Exp. Station Bull., No. 73.  
Verhandl. d. k. k. Zool. Bot. Gesell. Wien., Vol. LV, Nos. 9 and 10.  
Zeitschrift f. Wissenschaftlich Insectenbiologie, Vol. II, No. 2.  
Journ. Cinn. Soc. Nat. Hist, Vol. XX, Nos. 5, 6 and 7.  
North Carolina Dept. of Agric., Entom. Circular, No. 17.  
Proc. U. S. Nat'l Mus. Washington, Vol. XXIX, Nos. 1434, 1438, 1444.  
Wiener Entom. Zeitung., XXV, Nos. 2, 3 and 4.  
Annales de la Soc. Entomologique de Belgique, Vol. XLIX.  
Tijdschrift voor Entomologie, 1906, No. 1.  
Deutsche Entom. Zeitschrift, 1906, No. 1.

Mr. Schaeffer made some remarks on *Bradycinetus* and *Bolboceras*. In the Genera Insectorum, Boucaumont places *Bradycinetus* as a subgenus of *Athyreus*, which according to his own definition will not hold good. The principal characters separating the genera in this group are taken from the comparative width of the process separating the middle coxæ. In *Athyreus* the middle coxæ are separated by a process which is very wide and as long as broad, which is not the case in the species of *Bradycinetus* in which the process is always longer than broad and narrower between than behind the coxæ. *Bradycinetus* is more closely allied to *Bolboceras* than to *Athyreus* and may even prove not to be distinct from the former genus when the 129 species of *Bolboceras* are carefully examined. A new species from Arizona is in this respect intermediate, having the process narrower than our other species. Our common *Bolboceras farctus* has the process with a tooth-like elevation and has also the eyes completely divided (to which Linell has called attention) which makes the erection of a new genus necessary. *Bradycinetus hornii* and *B. minor* have the intermediate coxæ nearly contiguous, the process separating them is very narrow which places them in the genus *Bolboceras*. The different forms of the intermediate intercoxal process in the genera *Athyreus*, *Bradycinetus* and *Bolboceras* were illustrated on the blackboard and the North American species of the last two genera and also the North American species of *Copris* were exhibited. Mr. Barber exhibited a few Hemiptera-heteroptera from the Huachuca Mountains, Arizona and made some remarks concerning the distribution of some of the species. Among them were the following:

*Chlorocoris hebetatus*, *C. subrugosus*, *C. n. sp.*, *Hymenarcys crassa*, *Podisus lineolatus*, *P. marginiventris*, *Stachyocnemis apicalis*, *Narnia femorata*, *N. pallidicornis*, *Araphe carolina*, *A. cicindeloides* and *Stenomacra marginella*.

II. G. BARBER,  
Secretary.

## ERRATA ET ADDENDA.

- Page 175, line 37, for "*cruciaus*" read *crucians*.  
Page 176, line 7, for "rom," read from.  
Page 177, line 20, for "developement," read development.  
Page 178, line 3, from bottom, for "Roder" read Roeder.  
Page 181, line 25, insert (not Bellardi) after Blanchard.  
Page 182, line 26, for "Graham" read Grabham.  
Page 188, line 5, for "DEINOCERITIES," read DEINOCERITES.  
Page 189, line 36, for "20," read 21.  
Page 195, line 11, for "short" read long.  
Page 196, line 11, for "southermost," read southernmost.  
Page 196, line 13, for "*Gynometopa*," read *Gymnometopa*.  
Page 196, line 17, for "*fasiatus*" read *fasciatus* and insert (not deVillers).  
Page 198, after line 23, insert ? *Culex bracteatus* Coquillett, Proc. ent. soc. Wash. vii, 184, 1906.  
Page 198, line 20, for "Mexico" read Guatemala.  
Page 200, after line 5, insert *Culex varipalpus* Blaisdell, Ent. News, xvii, 107, 1906.  
Page 201, line 2, insert (not Walker) after Dyar.  
Page 201, after line 15, insert *Culex sylvicola* Grosbeck, Can. ent. xxxviii, 129, 1906.  
Page 202, after line 26, insert *Culex lativittatus* Coquillett, Ent. News, xvii, 109, 1906.  
Page 202, line 35, for "1905" read 1805.  
Page 202, line 36, for "1805" read 1905.  
Page 210, line 15, for "*Wyeomia*" read *Wyomyia*.  
Page 211, line 13, for "*pipens*" read *pipiens*.  
Page 212, line 5, for "cocoa," read cacao.  
Page 213, line 7, 8, for Barbadoes, read Barbados.  
Page 220, last line, for "four" read fours.  
Page 222, line 2, for *Wyeomia*, read *Wyomyia*.  
Page 222, line 27, for "*divisor*" read *divisor*.  
Page 225 and 226, for "*nivipes*" read *nivipes*.  
Page 225, line 13, insert "named" after have.  
Page 227, line 28, 29, dele "tube and plate with back basal ring" and for "*aporonoma*" read 10.  
Page 228, line 31, for "*Wyeomnia*" read *Wyomyia*.

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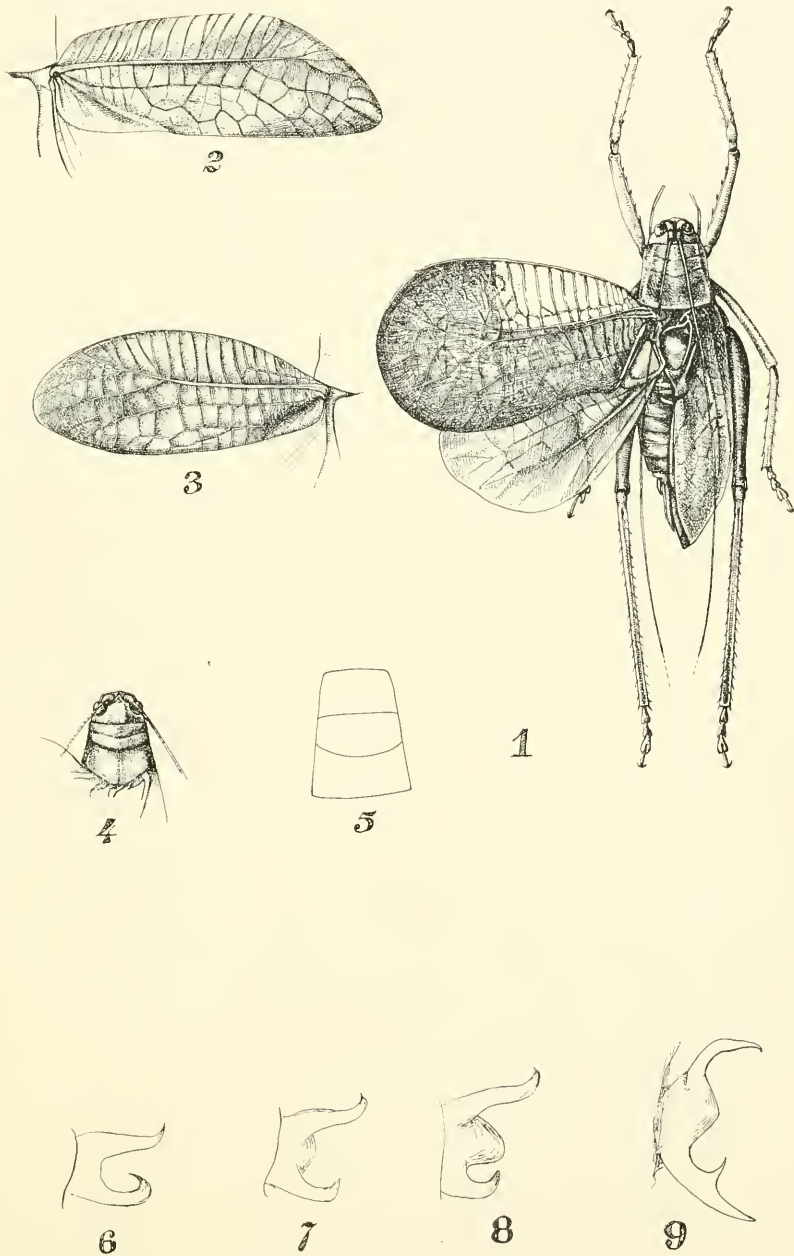


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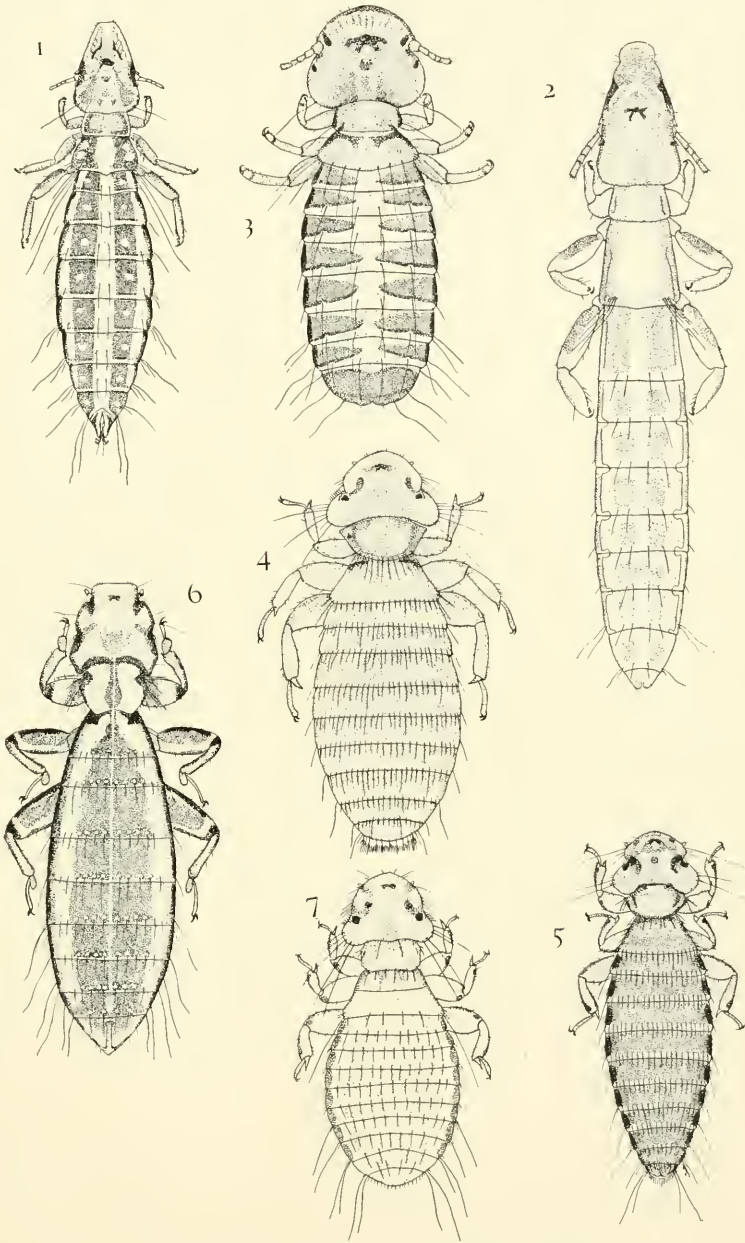




North American Orthoptera.

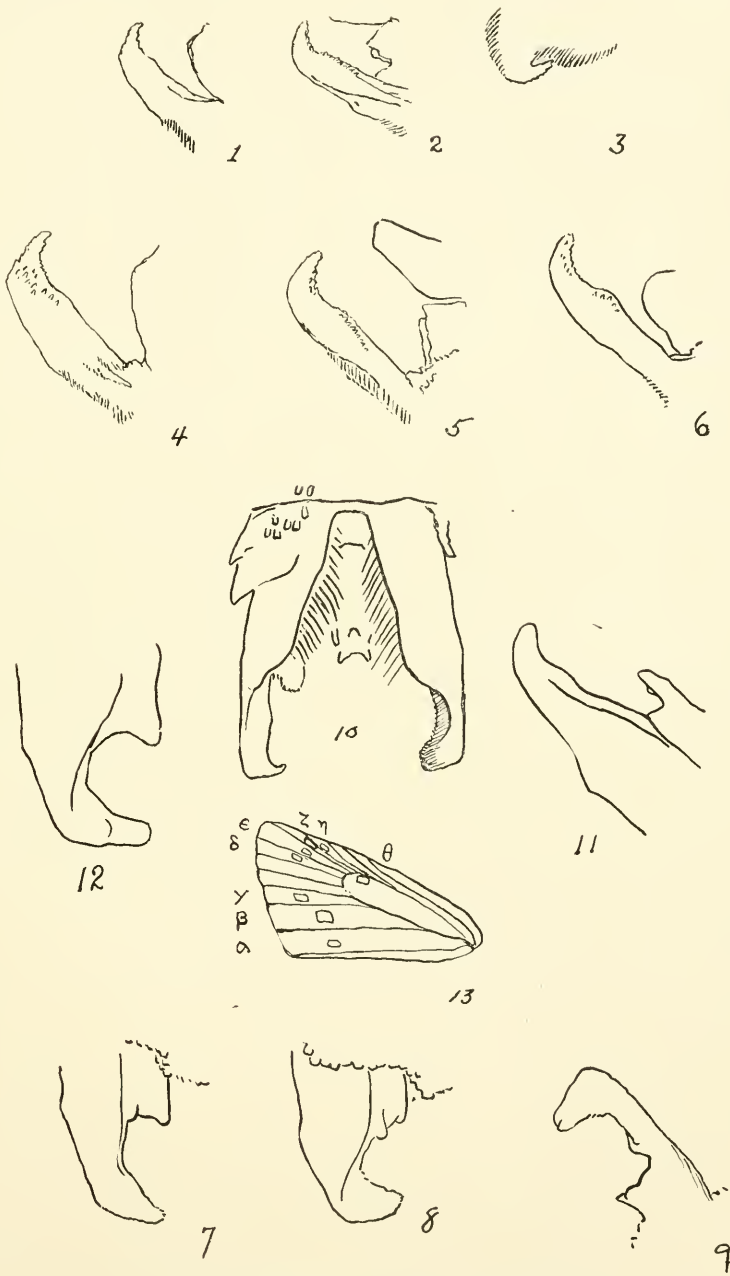






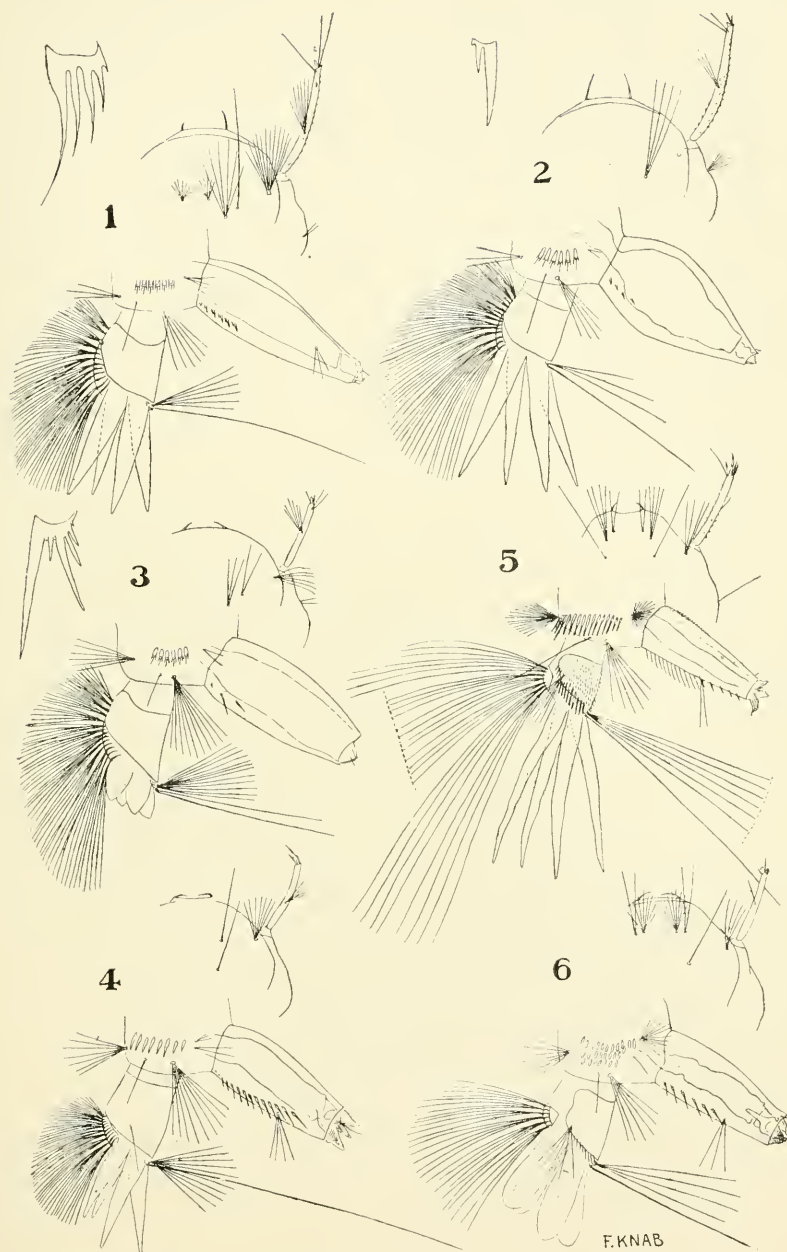
South American Mallophaga.





Genitalia of the genus *Thanaos*.



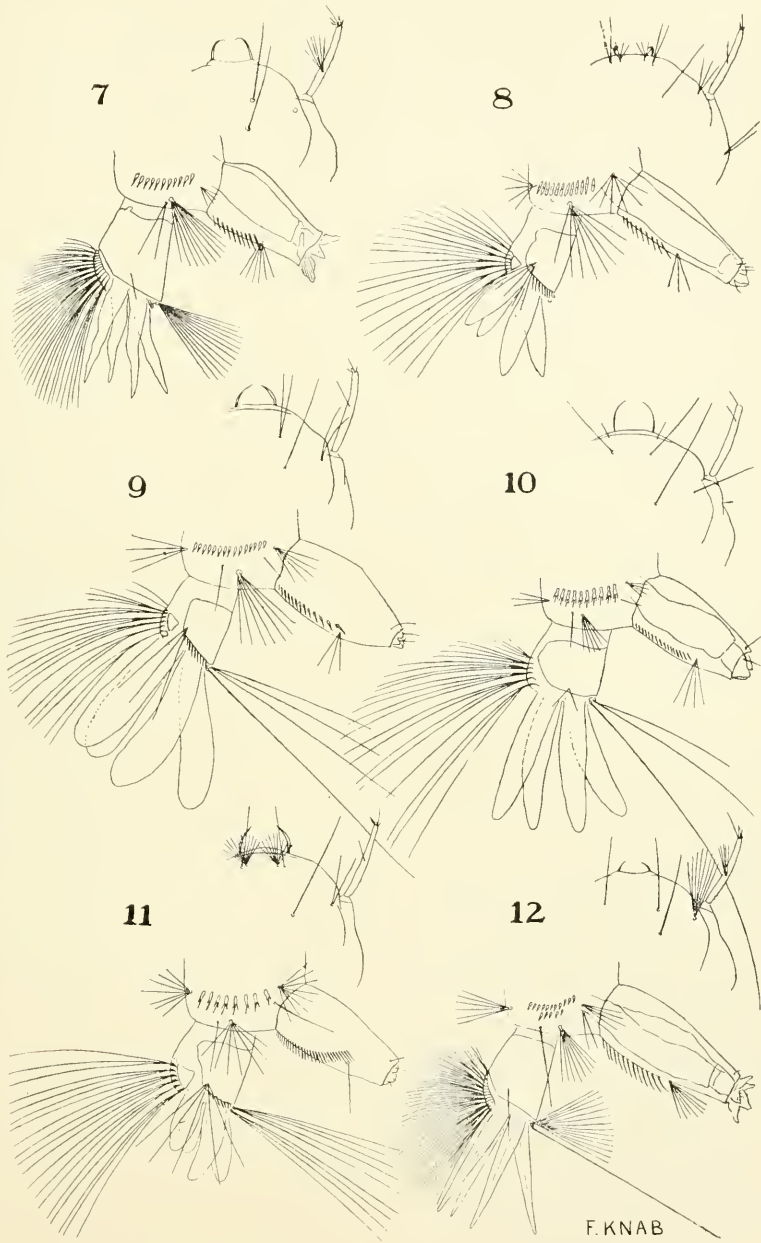


1. *Janthinosoma infine* D. & K.
3. *J. pygmaea* Theo.
4. *Aedes tormentor* D. & K.

2. *J. scholasticus* Theo.
5. *A. walkeri* Theo.
6. *A. busckii* Coq.







7. *Aedes meridionalis* D. & K.  
 9. *A. albonotata* Coq.  
 11. *A. mediovittata* Coq.

8. *A. philosophicus* D. & K.  
 10. *A. calopus* Meig.  
 12. *A. infirmatus* D. & K.

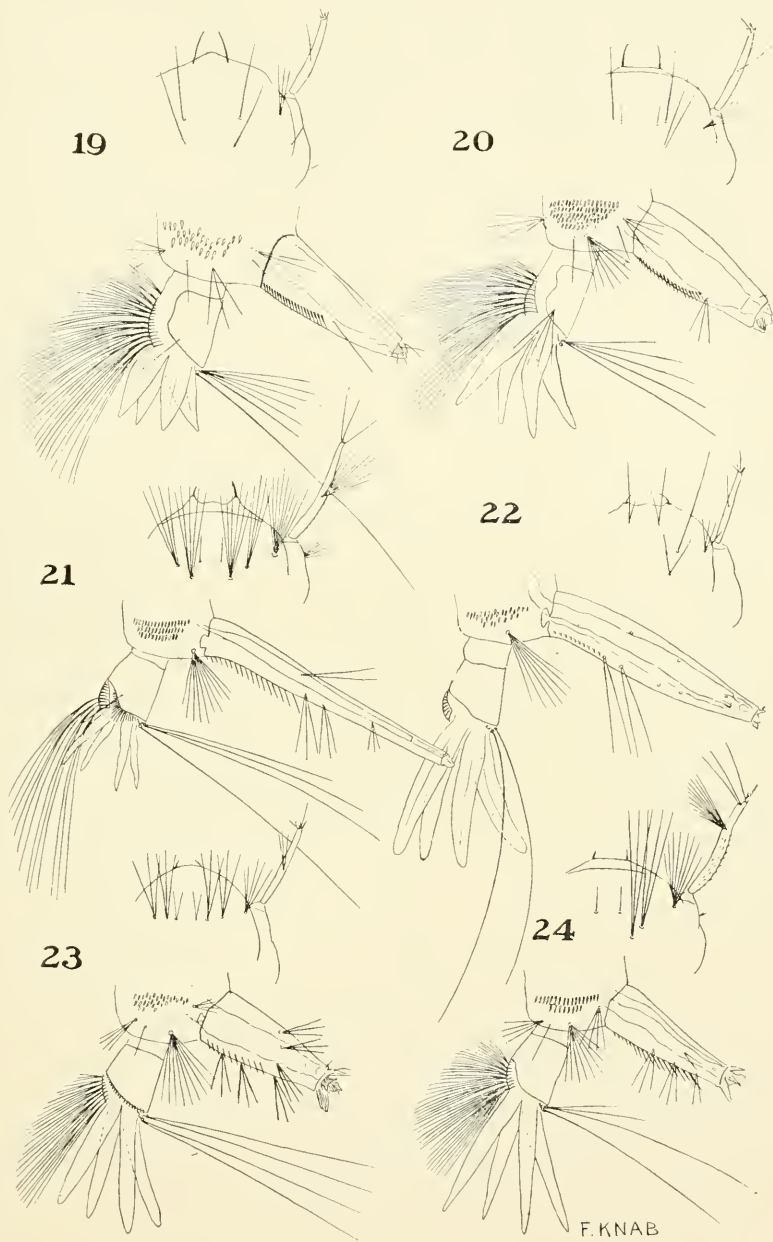




13. *Aedes damnosus* Say.  
 15. *A. atlanticus* D. & K.  
 17. *A. lateralis* Coq.

14. *A. habanicus* D. & K.  
 16. *A. euplocamus* D. & K.  
 18. *A. cyaneus* Fab.





19. *Aedes knabi* Coq.

21. *Culex bisulcatus* Coq.

23. *C. lactator* D. & K.

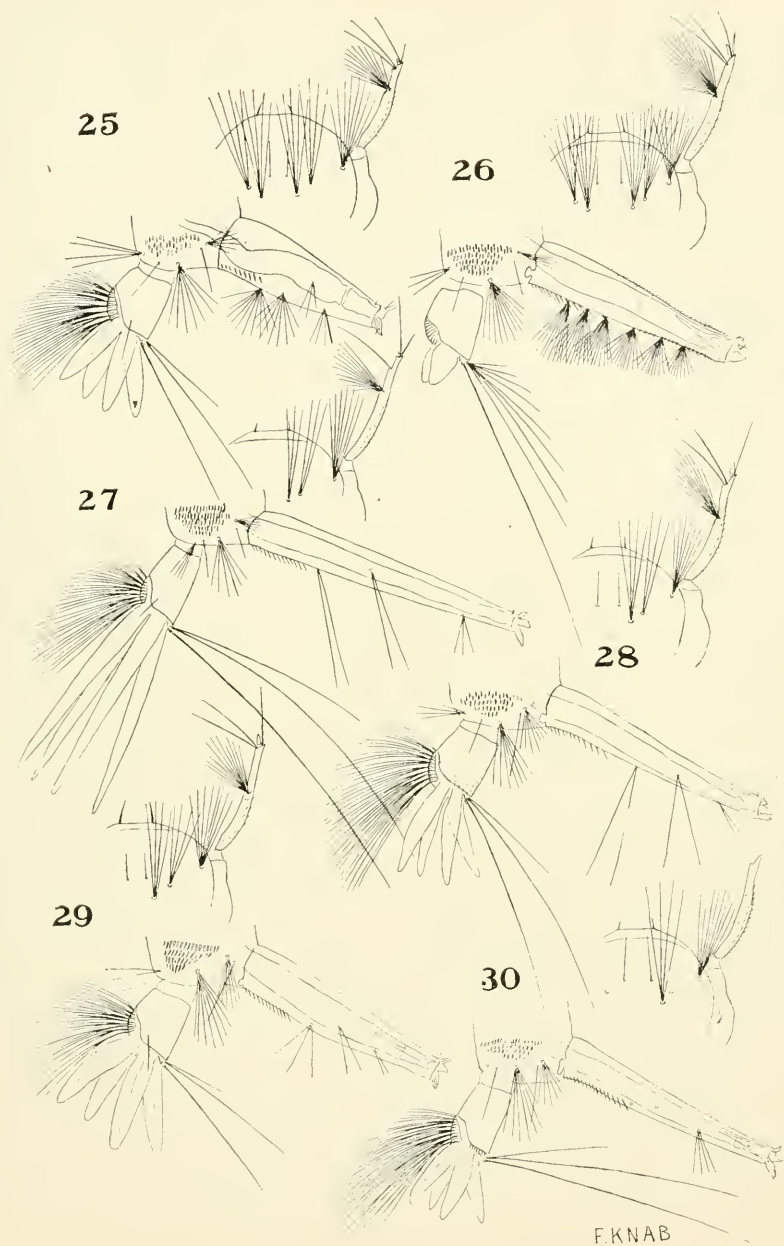
20. *A. insolita* Coq.

22. *C. pleuristriatus* Theo.

24. *C. interrogator* D. & K.



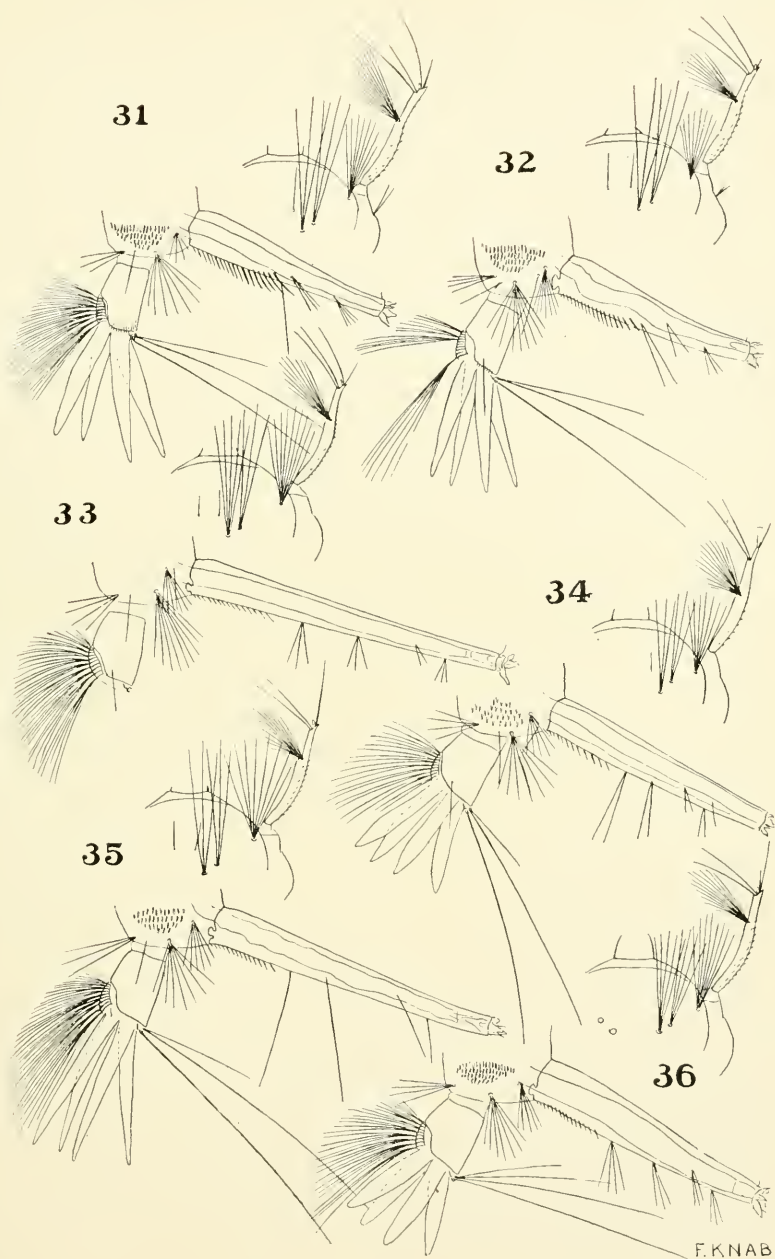




25. *Culex barbarus* D. & K.  
 27. *C. mortificator* D. & K.  
 29. *C. extricator* D. & K.

26. *C. bahamensis* D. & K.  
 28. *C. curmodyæ* D. & K.  
 30. *C. declarator* D. & K.





F. KNAB

31. *Culex proclinator* D. & K.

33. *C. habilitor* D. & K.

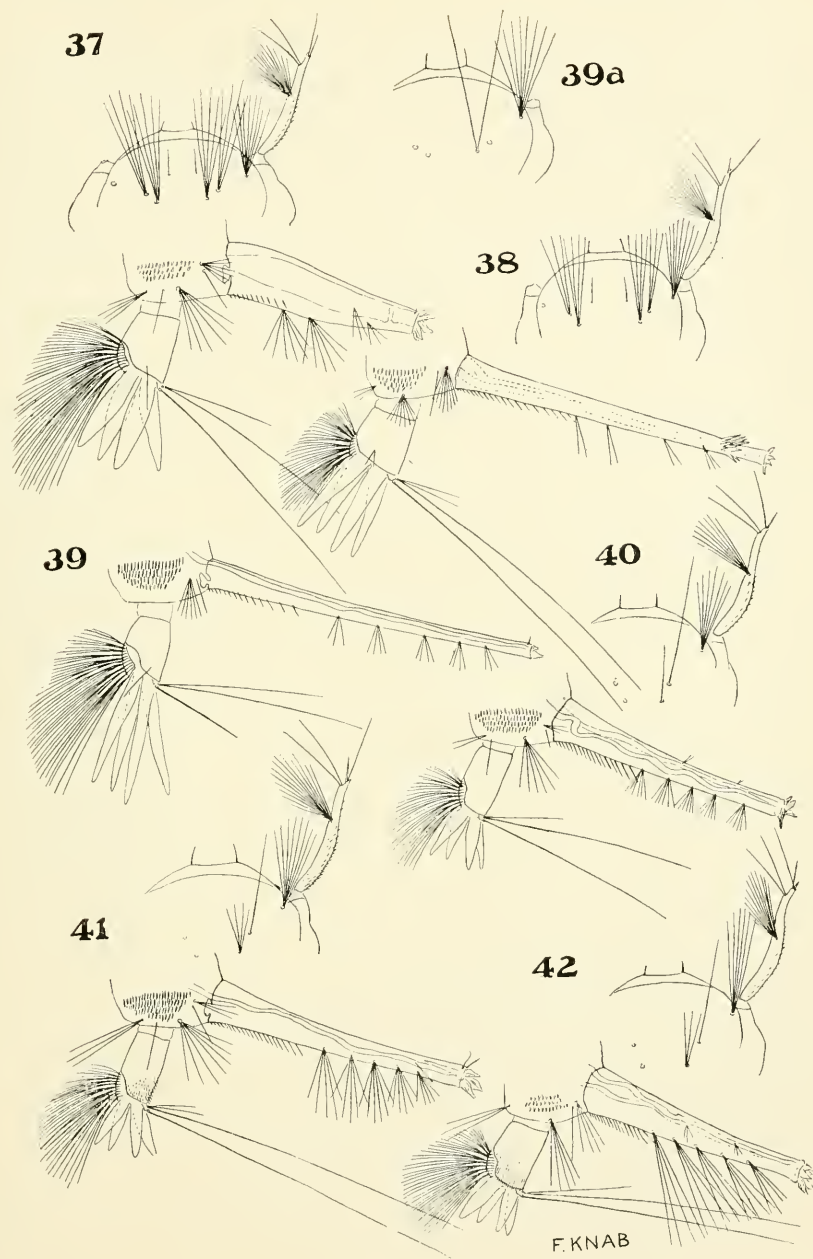
35. *C. regulator* D. & K.

32. *C. inquisitor* D. & K.

34. *C. factor* D. & K.

36. *C. pipiens* Linn.



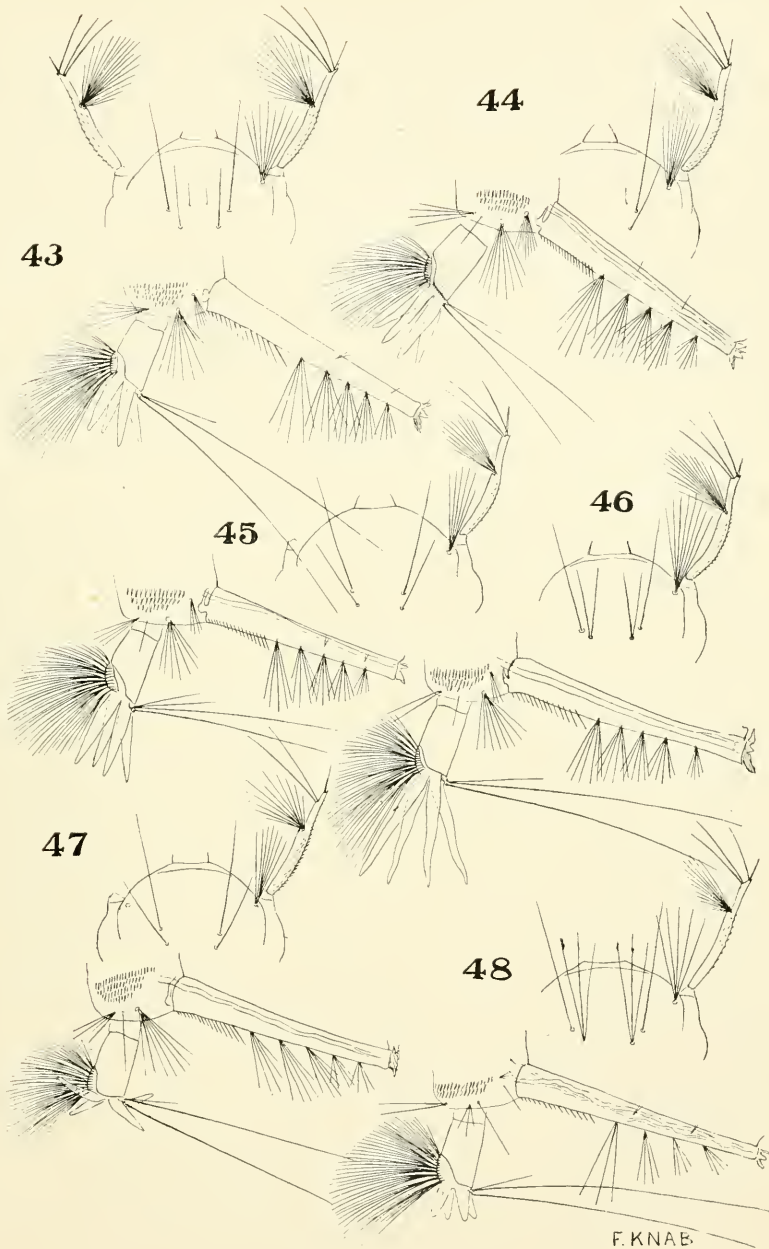


37. *Culex cubensis* Big.  
39. *C. derivator* D. & K.  
41. *C. inhibitor* D. & K.

38. *C. coronator* D. & K.  
40. *C. investigator* D. & K.  
42. *C. mutator* D. & K.



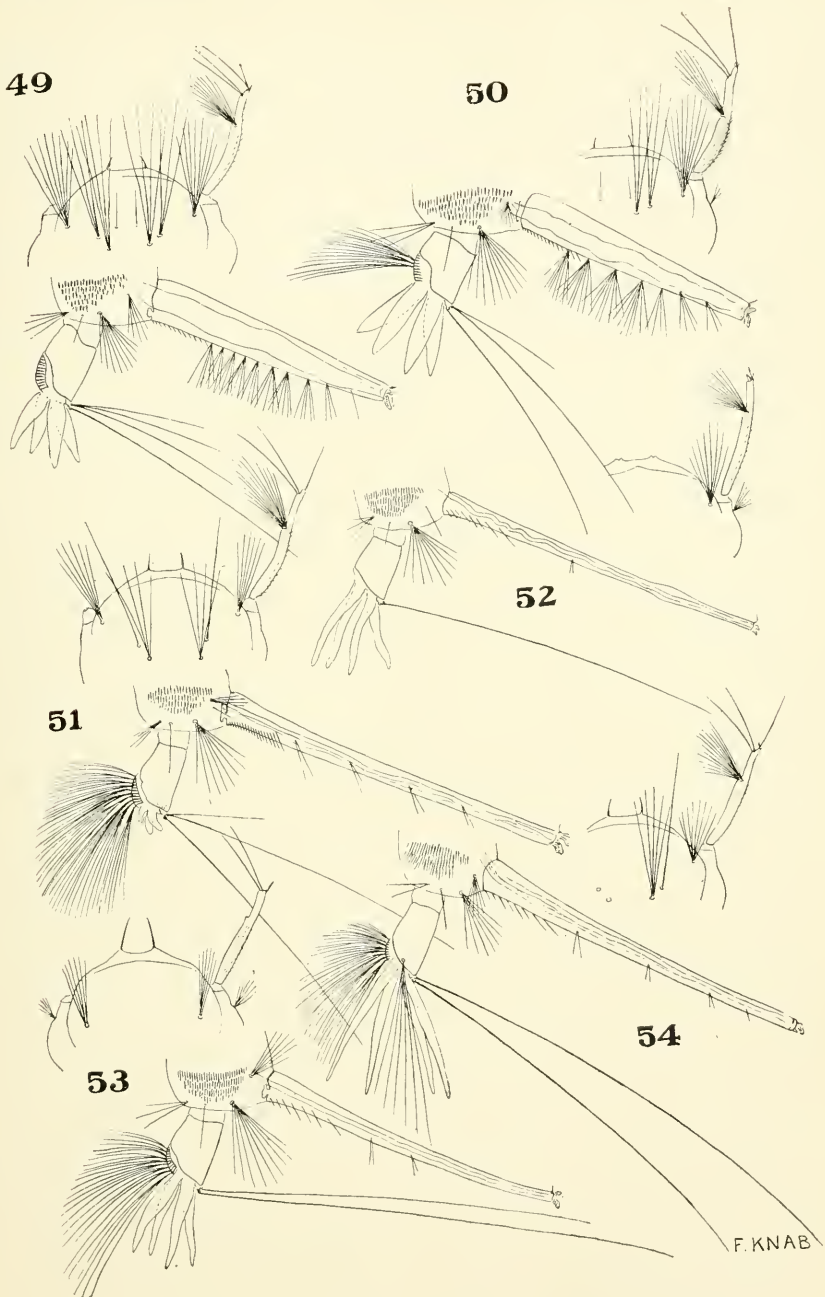




43. *Culex elevator* D. & K.  
 45. *C. conspirator* D. & K.  
 47. *C. gravitator* D. & K.

44. *C. educator* D. & K.  
 46. *C. simulator* D. & K.  
 48. *C. decorator* D. & K.



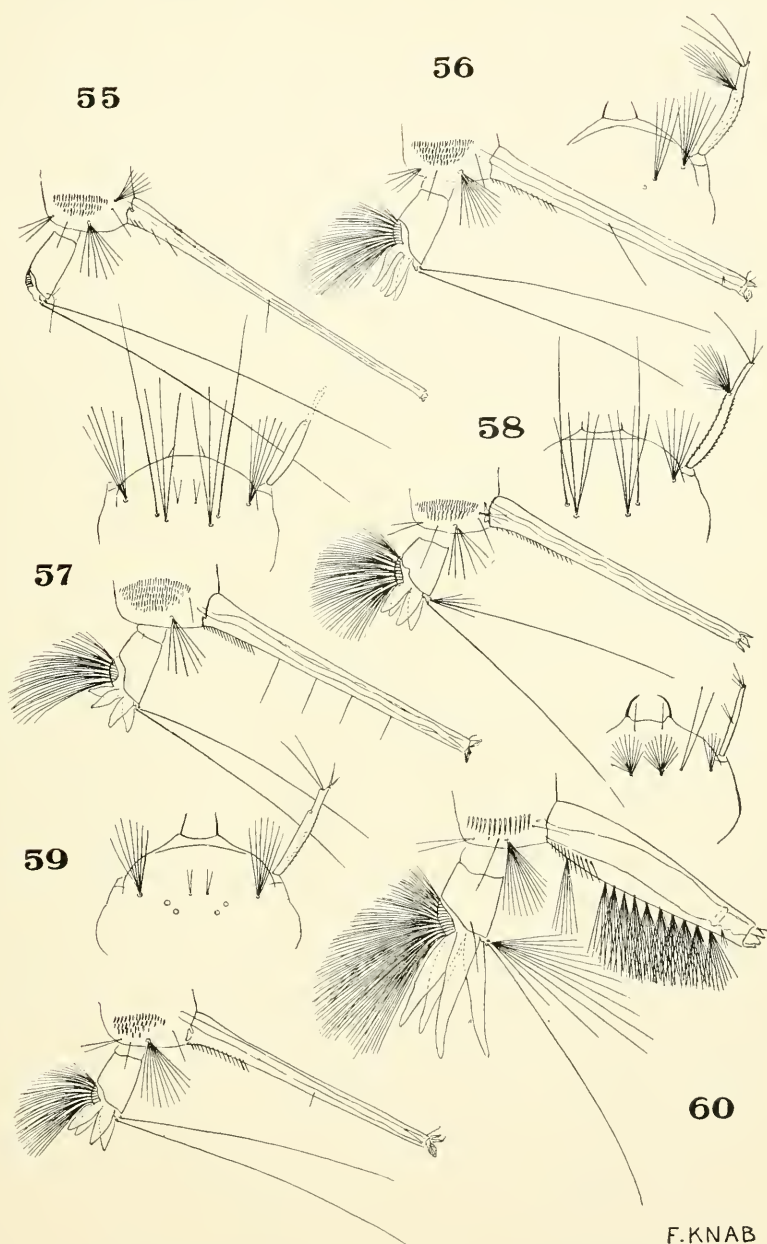


F. KNAB

49. *Culex secutor* Theo.  
 51. *C. carcinophilus* D. & K.  
 53. *C. vector* D. & K.

50. *C. lamentator* D. & K.  
 52. *C. daumasturus* D. & K.  
 54. *C. rejector* D. & K.





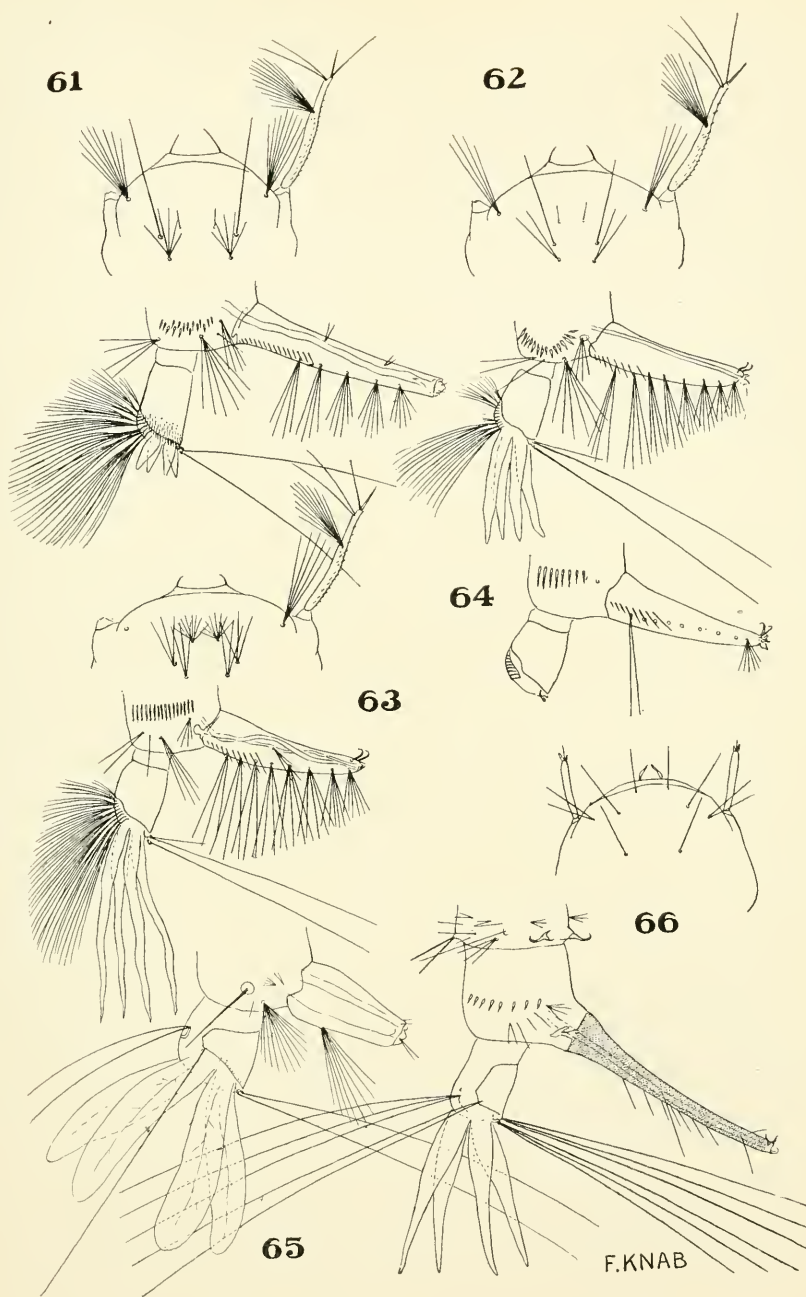
F. KNAB

55. *Culex inimitabilis* D. & K.  
 57. *C. restrictor* D. & K.  
 59. *C. divisor* D. & K.

56. *C. conscriptor* D. & K.  
 58. *C. latisquamma* Coq.  
 60. *Mochlostyrax urichii* Coq.



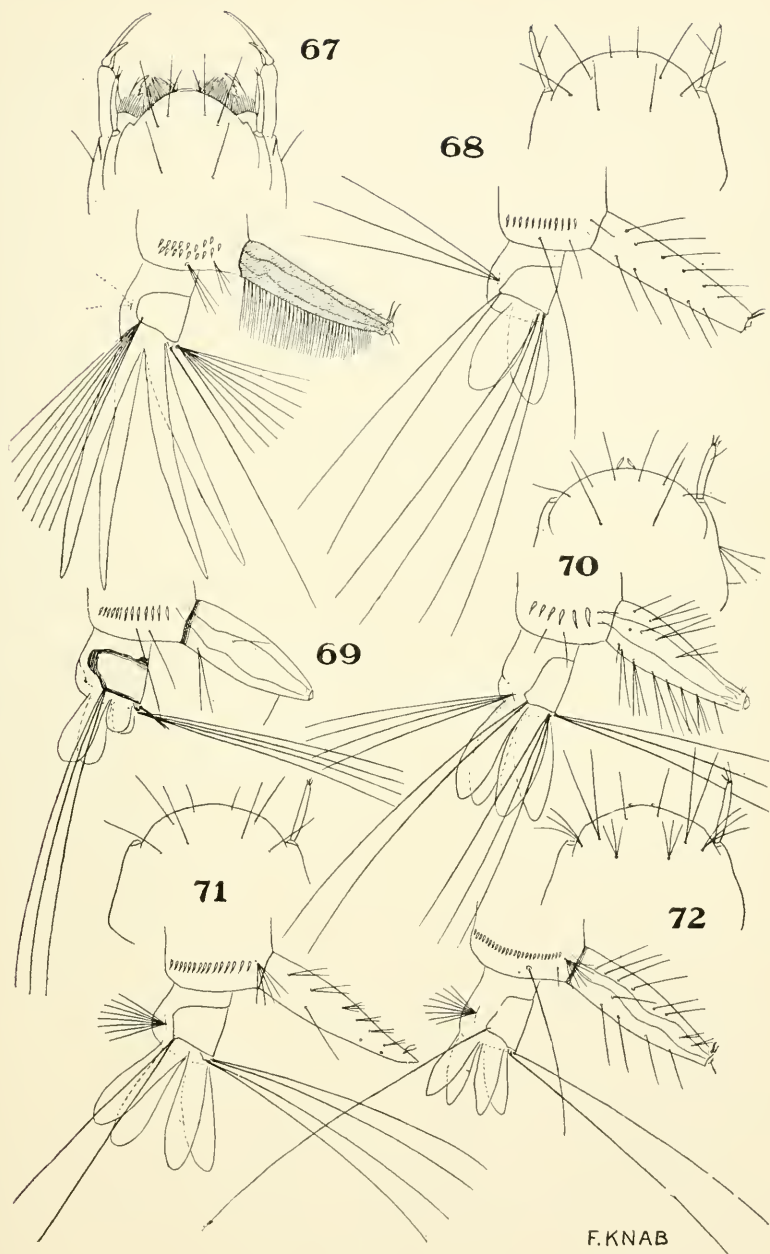




61. *Mochlostyrox erraticus* D. & K.  
 63. *M. caudelli* D. & K.  
 65. *Joblotia niveipes* Theob

62. *M. pilosus* D. & K.  
 64. *M. cubensis* D. & K.  
 66. *Sabethoides undosus* Coq.





67. *Lesticocampa lunata* Theo.

69. *W. asullepta* Theo.

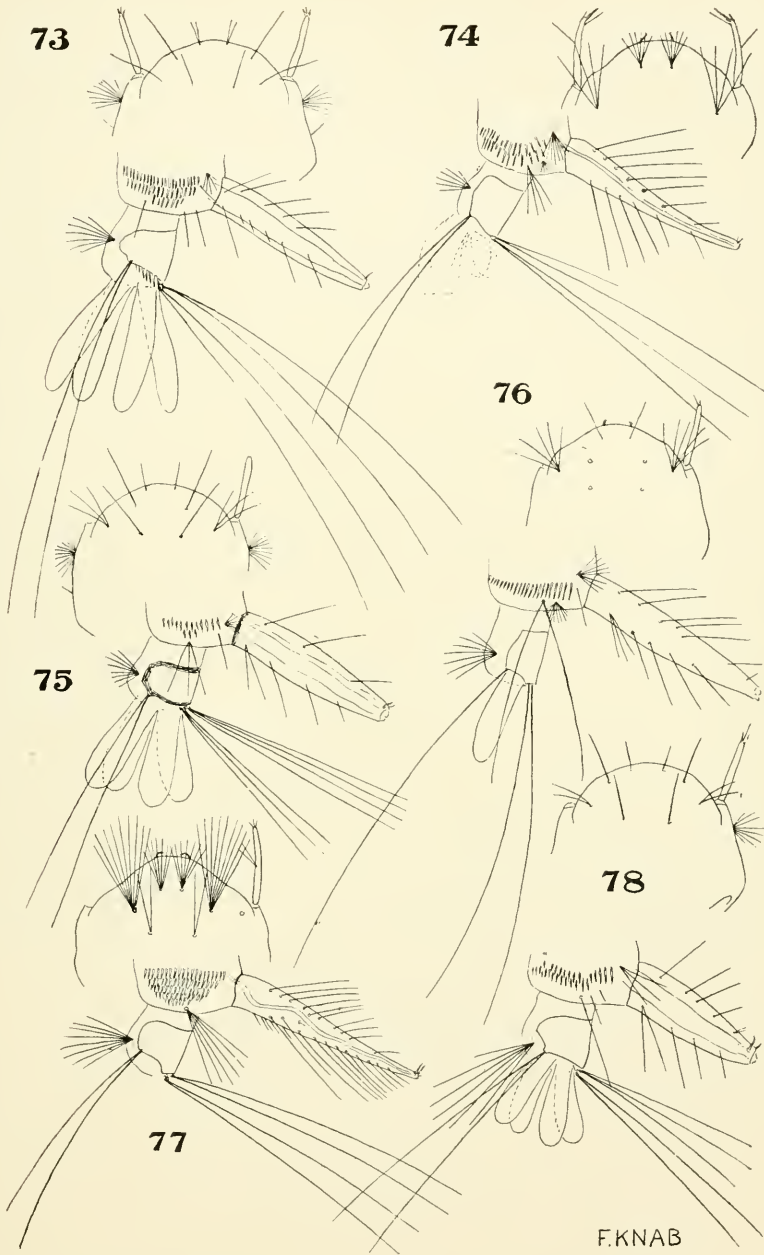
71. *W. grayii* Theo.

68. *Wyomyia smithii* Coq.

70. *W. durhami* Theo.

72. *W. ochrura* D. & K.





73. *Wyeomyia ulocoma* Theo.  
75. *W. aporonoma* D. & K.  
77. *W. autocratica* D. & K.

74. *W. longirostris* Theo.  
76. *W. telestica* D. & K.  
78. *W. hemisagnosta* D. & K.



































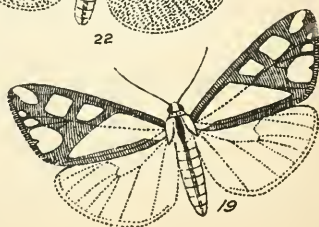
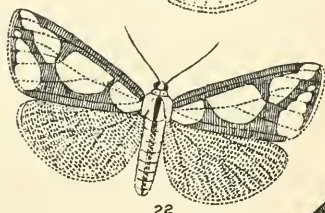
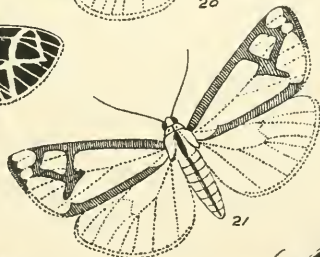
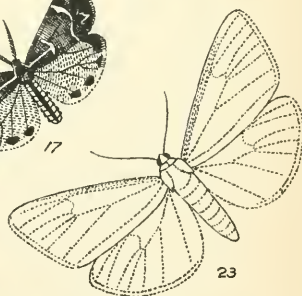
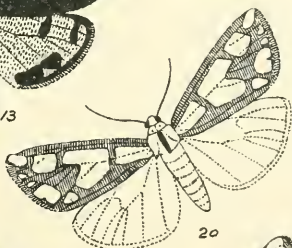
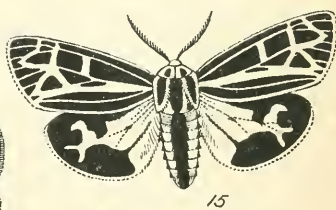
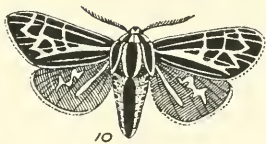
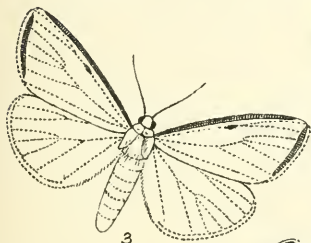
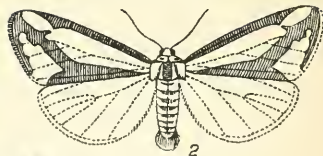
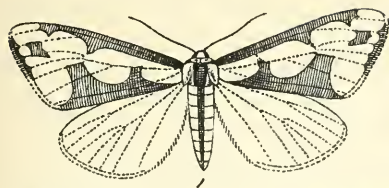




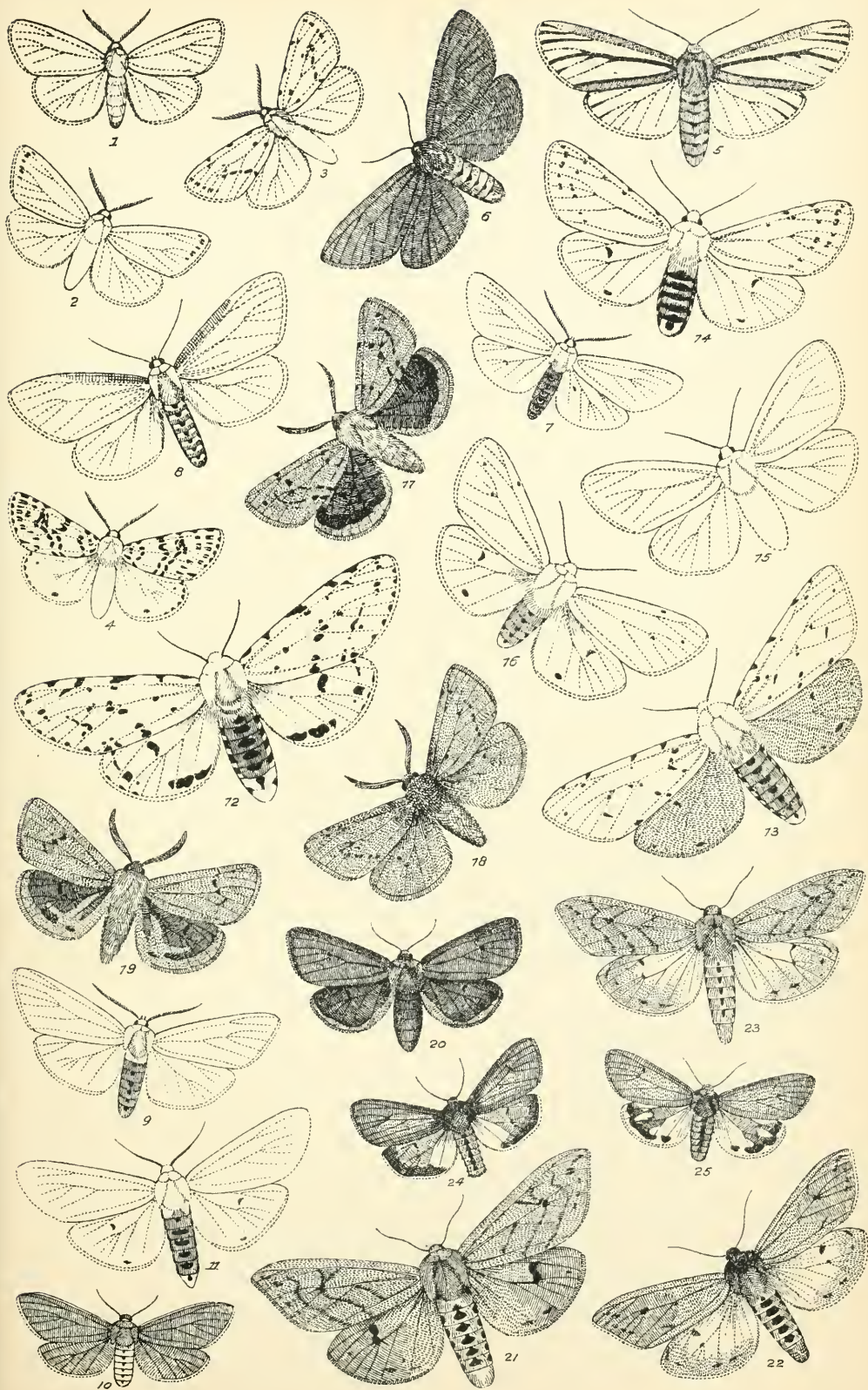


























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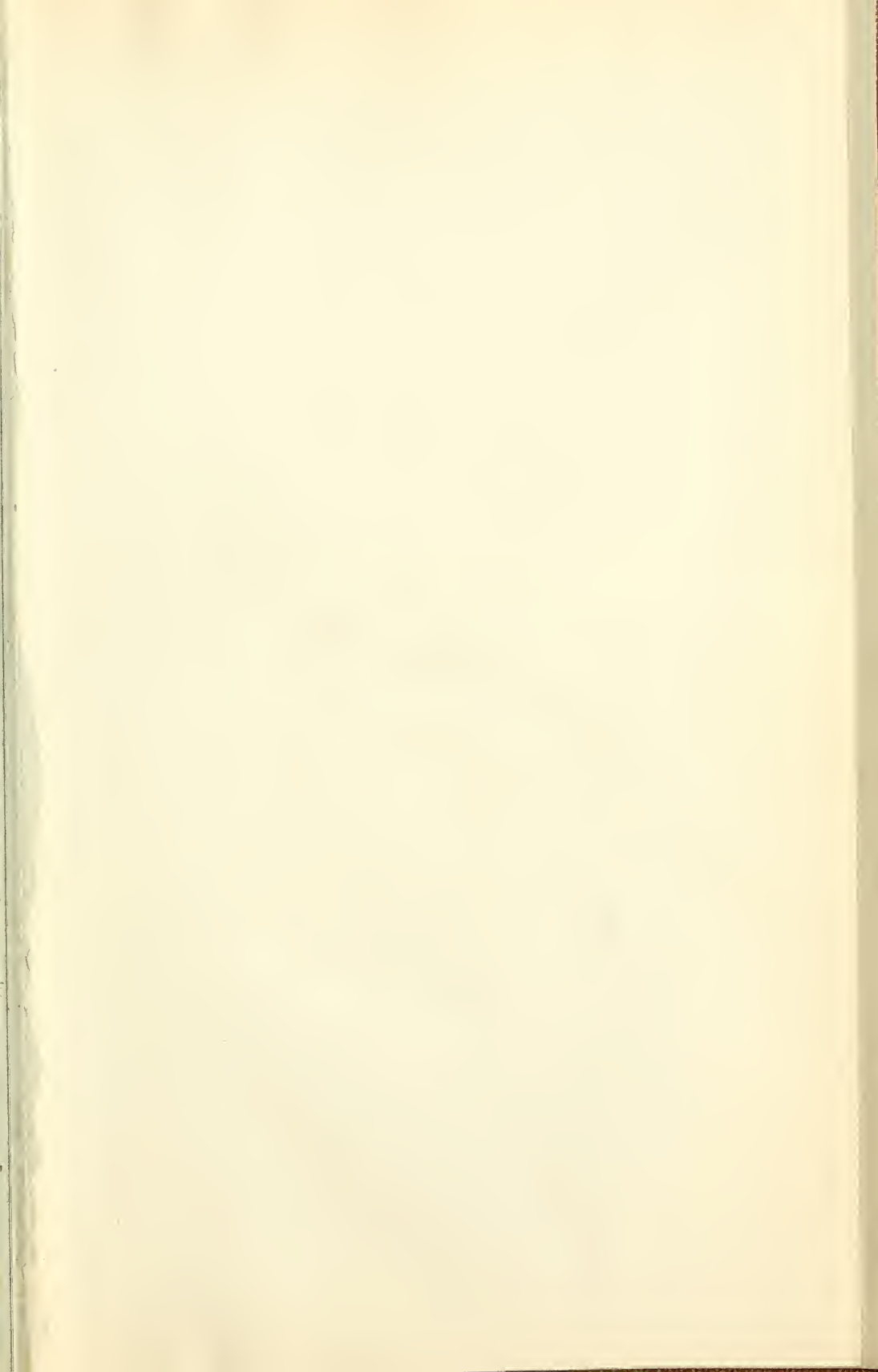
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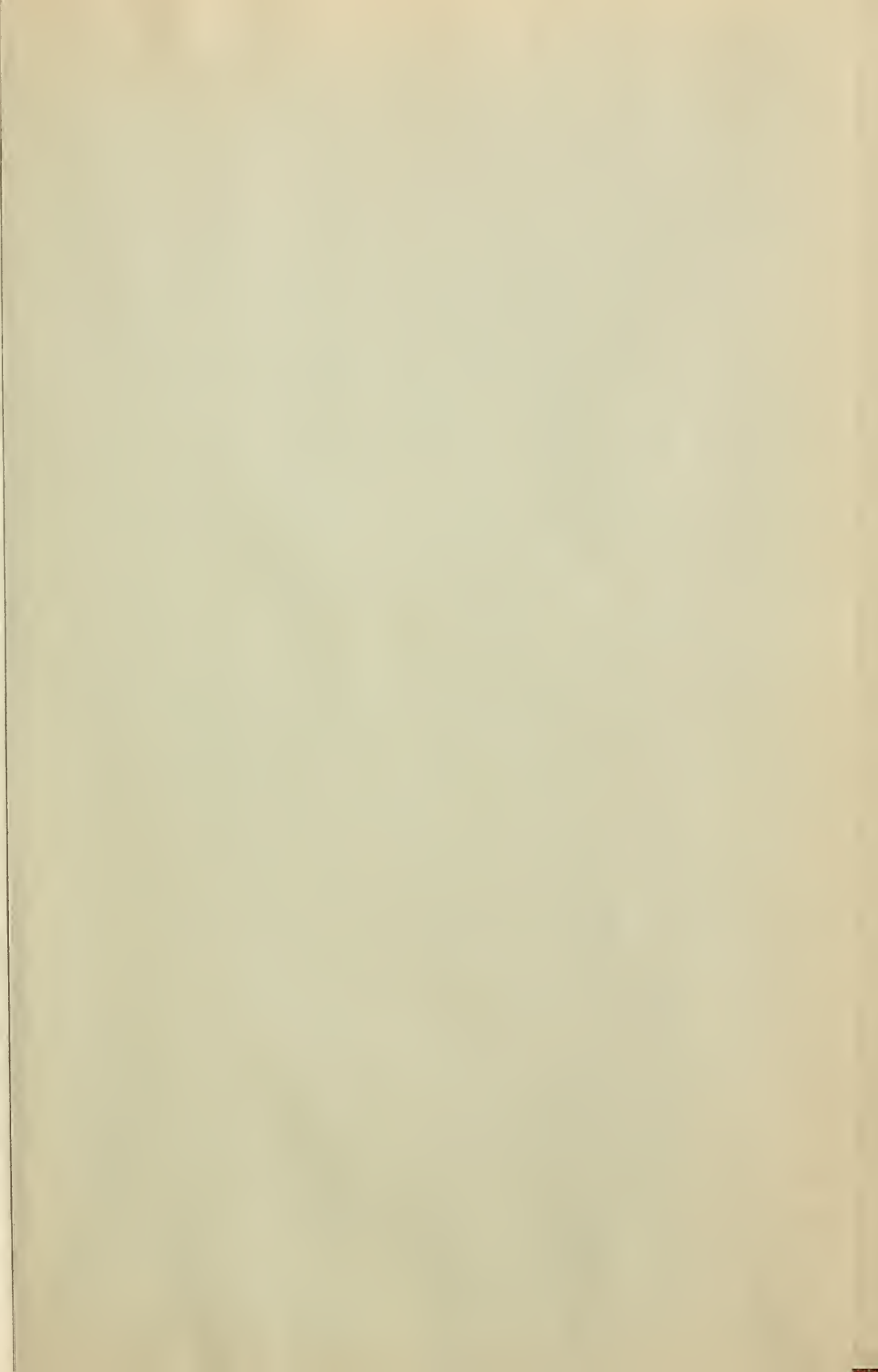
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